MANAGING THE DEVELOPMENT OF SUSTAINABLE GENERIC GLOBAL COMPETENCIES FOR ENGINEERING AND BUSINESS GRADUATES USING NOVEL LEARNING ENVIRONMENTS

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ABSTRACT: Recent research relating to the need to consider generic competencies for engineering education in the context of global workplaces is reviewed and further developed within the context of a requirement for such competencies to be developed and practiced with due consideration given to a global social responsibility. Particular difficulties relating to the achievement of such competencies are analysed and solutions proposed. A portfolio of generic competencies is developed in the context of global workplaces and considered against factors such as ethnicity, culture, language, religion and ethics. The value of novel learning environments such as the workplace, the home, the community and life-places are discussed in relation to a European Life-place project and competence development. It is concluded that the use of a range of novel learning environments inclusive of the life-place environments can provide considerable advantage over the traditional on-campus education environment particularly in relation to delivering of the competencies within the context of a rapidly developing global information society It is further shown that globalisation of competencies provides for more effective career development with the establishment of a social responsibility mindset being considered as mandatory alongside competence in independent judgement for sustainable employability.

1. INTRODUCTION

Chisholm and Burns [1] reported successful research on the use of a range of off-campus learning environments where the learning does not necessarily have to be related to specific subject disciplines but where these trans-disciplinary environments support the integration of explicit and tacit learning involving competencies deriving from the study of a number of interacting disciplines. They proposed a new learning paradigm called life-place learning which involves a highly flexible, learner led system and operates in a person's life - places such as the non-paid workplace, the home, the community and leisure based environments.

Davis and Chisholm [2] continued this research leading to the establishment of life-place learning as a successful working concept which has at its core the recognition of all learning regardless of where it is achieved and as reported by Chisholm [3], supports the idea of negotiated explicit and tacit learning in a learner led system to deliver skills and competencies. The main factors relating to the accreditation of life-place learning were reported earlier by Davis and Chisholm [4]. It was further reported by Chisholm, and Blair [5] [6] that much of what has developed as theory and practice in relation to paid work-based learning has transferability to other life-place environments. Luegenbiehl [7] reported that fundamental to the life-place learning model was the belief that the most effective learning in terms of the development of competencies is the recognition of the personal and professional autonomy of the individual learner. Earlier research studies by the authors showed the value of learners having personal autonomy in terms of underpinning their achievement of a range of competencies. Employability is about having the requisite profile of subject specific and generic competencies and knowledge to support graduates in sustaining a suitable career. In the now mass education system many engineering and business students complete a course without the focus of a planned career built around employment of their choice. At the core of employability is the need for the curriculum to provide for the profile of global competencies which will underpin graduates achieving a job career in the global market-place. Employability is also concerned with developing competencies in the contexts of a global information society and social responsibility. Educators now have to recognise the key importance of taking a global perspective in relation to achieving generic competencies which can underpin engineers being successful in the global society. Generic competencies need to be developed through collaborative studies where national and cultural boundaries are transcended. Engineering graduates need to have competencies which support them working across world time zones in common projects with a number of different nationalities involved where factors such as ethnicity, culture, language, religion and ethics will need to be understood and put in context. So educators need to look at generic competencies in

essentially a borderless world where increasingly the economies of countries and social structure are becoming increasingly interconnected. High value engineering is now developed around the world and so practice has to be taken forward within an overall global context thus leading to graduates working anywhere in the world on design, marketing, computing, manufacturing and having to interpret in terms of a rapidly developing global society. Thus generic competencies properly developed in the global context will support engineering and business graduates working in cross cultural teams where cultural barriers are removed. Anecdotal evidence suggests that global experience and experiential development of generic competencies will complement specific technical expertise and thus provide the profile to ensure success for the next generation of graduates in the global job markets. Despite evidence that global generic competencies are of key value for global employability, educators have been slow to address this need in engineering programmes. The modern undergraduate curriculum is now often overloaded with new developments. Placements abroad in another educational establishment or an industrial workplace are a possibility. The authors in this paper consider what are the key generic competencies and how these could be achieved using off-campus life-based learning environments which have been researched across Europe as an alternative.

2. DEVELOPMENT OF EMPLOYMENT RELATED GENERIC COMPETENCIES

The latest developments have seen employability and related skills and competencies compete for the limited time available for on-campus programmes. What needs to be considered is whether it is possible to realise all the requirements relating to qualifying at a given level within an on-campus course. The authors believe from their life-place learning research that many aspects of the curriculum associated with personal, professional and career planning and the associated competencies can be best achieved using an off-campus approach, allowing educators to concentrate on the teaching of subject fundamentals in the classroom. Anecdotal evidence shows that many of the generic skills and competencies can be best established outside the traditional classroom environment. However it is doubtful if introducing personal development planning into the busy curriculum can by itself sustain the development of the learners' long term capability and employability. Life-place learning as a model could contribute to the overall process by allowing learners to negotiate how to develop

generic competencies using a range of extra-curricula activities combined with facilitating learners develop accredited recognition of competencies developed through unintentional learning during their life experiences off-campus. Typically competencies could be established during employment by the learner once on-campus studies have been completed for a given academic study year. By formalising unintentional learning, under a life-place approach the learner could demonstrate through reflection, competencies achieved and be formally assessed as appropriate.

The Engineering Subject Centre, part of the Higher Education Academy Learning and Teaching Support Network (LTSN) published a Student Employability Profile in October 2004 [8]. An examination of the general competencies detailed and the Employers' criteria for employability shows how effective the life-place model could be if integrated with the on-campus discipline based learning. Within this paper the illustration of delivery of employability skills and competencies is intended to be illustrative rather than exhaustive. The competencies are shown in Table 1 and the employers' criteria in Table 2.

As can be seen from the tables many of the desired competencies could be developed through extra curricula activities involving all the life-places in which a person takes forward their everyday living. More recently Chisholm [9] reported on the need to develop competencies within the context of a global information society and typical examples of the generic competencies which were earlier reported as being relevant for engineers to move forward within the context of an expanding global information society are shown in Table 3.

Table 1. Illustrative example of competencies relevant to employability from the Student Employability Profiles – LTSN Engineering Subject Centre (2004).

ACHIEVEMENT ORIENTATION	Maintains and inspires a results-driven approach, focuses on results and critical performance indicators
ADAPTABILITY / FLEXIBILITY	Maintains effectiveness in a changing environment
ANALYSIS	Relates and compares data from different sources, identifying issues, securing relevant information identifying relationships
ATTENTION TO DETAIL	Accomplishes tasks through a concern for all areas involved, no matter how small

COMMERCIAL AWARENESS	Understands the economics of the business. Understands the business benefits and commercial realities from both the organisation's and the customers perspectives
CREATIVITY	Generates and/or recognises how best practice and imaginative ideas can be applied to different situations
DECISIVENESS	Makes decisions and takes action
FINANCIAL AWARENESS	Understands basic financial terminology used in organisations and is able to construct and maintain simple financial records
IMAGE	Presents a strong, professional, positive image to others at all times. This image is consistent with all people (colleagues, management and peers, customers etc.)
INFLUENCING	Influences others by expressing self effectively in a group and in one to one situations
INITIATIVE	Identifies opportunities and is pro-active in putting forward ideas and potential solutions
INTERPERSONAL SENSITIVITY	Recognises and respects different perspectives and appreciates the benefits of being open to the ideas and views of others
JUDGEMENT	Determines the most appropriate course of action and draws conclusions that are based on logical assumptions that reflect factual information
LEADERSHIP	Takes responsibility for the directions and actions of a team
LIFE LONG LEARNING AND DEVELOPMENT	Develops the skills and competencies of self, peers and colleagues through learning and development activities related to current and future roles
LISTENING	Shows by a range of verbal and non-verbal signals that the information being received is understood
ORGANISATION UNDERSTANDING	Understands the organisation's work environment, internal politics, business objectives and strategy
ORGANISATIONAL SENSITIVITY	Is sensitive to the effect of his or her actions on other parts of the organisation and adopts a mature, direct and up front style in dealing with conflict
PERSONAL DEVELOPMENT	Maintains an up-to-date personal development plan and takes action to ensure personal development takes place
PLANNING AND ORGANISING	Establishes a course of action for self and/or others to accomplish a specific goal. Plans proper assignments of personnel and

	appropriate allocation of resources
PROCESS OPERATION	Begins, controls and concludes a complete process of procedure
QUESTIONING	Uses an appropriate approach to questioning in order to gain information from which to draw conclusions and/or assists in the making of decisions
TEAMWORK / WORKING WITH OTHERS	Builds and develops appropriate relationships with academic staff, peers, colleagues, customers and suppliers at all levels within an organisation
TOLERANCE FOR STRESS	Maintains performance under pressure and / or opposition
WRITTEN COMMUNICATION	Expresses ideas effectively and conveys information appropriately and accurately

Table 2. Qualities and attributes identified by employer members of the Policy Forum of the Council for Industry and Higher Education from the Student Employability Profiles – LTSN Subject Centre (2004)

- **Brainpower:** The ability to identify and solve problems, work with information and handle a mass of diverse data, assess risk and draw conclusions.
- **Generic Competencies:** High level and transferable key skills such as the ability to work with others in a team, communicate, persuade and have interpersonal sensitivity.
- **Personal Capabilities:** The ability and desire to learn from oneself and improve one's self awareness and performance. To be a self starter (creativity, decisiveness, initiative) and to finish the job (flexibility, adaptability, tolerance to stress).
- **Subject Specific Knowledge:** Depending on the job, not most obvious and necessary in vocational areas.
- **Technical Ability:** For example, having the knowledge and experience of working with relevant modern laboratory equipment.

Learner's life-places are now very much where the contexts of race, language, culture, ethnicity and religion are liable to be experienced such that competencies develop within the context of living and working in a global information society. For example global competencies could be achieved through a gap year. By using the life-place model approach the learner could complete a descriptor defining the desired competence outcomes, complete the gap year and on returning complete the assessment. This is illustrative of how the life-place environments could provide a real world trans-disciplinary environment to facilitate this form of learning which is essentially experiential rather than academic subject based. The competencies shown in Table 1 can all be better delivered in real world life-place environments where the learners can draw on all their experiential living and formalise the outcomes using the life-place learning model as

described in the paper. The key aspect is the conversion of what is often informal or unintentional learning using the life-place approach which facilitates assessment and the award of credit if requisite. The workplace for example could support the delivery of many of the competencies and facilitate putting them in the context of a global information society.

Table 3. Competencies within the context of a Global Information Society. Chisholm [9]

- Take forward and embrace a personal ethic of social responsibility and service within the community based environments which are racially, culturally ethnically and linguistically different from their.
- Practice culturally appropriate relationship centred involvement within the global environments in which they work.
- Use communication and information technology that can deliver information to communities of practice who are from diverse racial, ethnic, religious, cultural and linguistic backgrounds.
- Provide leadership that is totally inclusive of ethnic and cultural backgrounds and supports shared decision-making.
- Be able to work on as a team member within inter- and trans-disciplinary systems where diverse ways of thinking, being and doing are the basis of practice.
- Show ethical behaviour in all aspects of practice, both personal and professional which involves individuals from diverse global backgrounds.
- Show empathy with all diverse communities and individuals affected by engineering decisions taken in any given situation or environment.
- Consider for planning, development and generating engineering products and services the value and need to incorporate the determinants of global based views regardless of ethnicity, culture or race.
- Actively support and promote education and learning to improve the well being of a global society.
- Ensure that all interpersonal interactions in the job role and in other life-places are competent and effective within the context of linguistic, racial, ethnic and cultural differences.
- Incorporate fundamental consideration of relevant aspects of cross-cultural diversity into critical thinking, reflective analysis and problem solving in engineering.
- Support within their job role culturally aware developments and practices alongside ensuring inclusion and participation of communities of practice which reflect ethnic, racial and linguistic diversity.
- Continuously review and improve cultural competence at the personal and professional levels and within the organisational systems through the engineering job role.
- Within global working be prepared to deliver product development and engineering systems which are culturally appropriate and meet the needs of a diverse global community.
- In decisions and in delivering engineering practice ensure a balance of consideration at individual, professional, system and global societal needs.

However this means access to unpaid work where the learner and the educators can negotiate what the learner will do in the workplace and what will be the desired skills and competence outcomes. It is also possible for learners to achieve outcomes in a paid workplace. However in this case the learner would be using this life-place to achieve unintentional learning as the employer would set the job outcomes to suit the organisation rather than the learner. However by prior agreement with the educators the learner could reflect on a continuous basis through a life-place learning approach involving the unintentional learning achieved while delivering the job role and thus be able to match up to some of the desired employability competencies. In such a situation, learners could be in a position to achieve competencies such as listening, organisational understanding, sensitivity, process operation, questioning, teamwork, creativity and initiative.

3. ALTERNATIVE LEARNING ENVIRONMENTS

The Scottish Enterprise and Lifelong Learning Committee [1] indicated that the governing principles for a lifelong learning strategy should include promoting a learner-led system of education that is flexible and responsive to the needs of the individual and society and the enabling of everyone to access appropriate learning. We believe that the current concentration of educational institutions on traditional on-campus learning is unlikely to realise this strategy, and whilst work-based learning has seen significant growth over the past decade, there is a need to introduce alternative learning environments which can support the delivery of generic competencies and which are based around learner led systems.

Chisholm and Burns [1] proposed a new learning paradigm called Lifeplace Learning (LPL) which would be highly flexible, learner-led and based in life places such as the non-paid workplace, the home and the community. Davis and Chisholm [2] continued to research this paradigm and this has led to a number of recent publications and to the establishment of LPL as a successful working model.

A global research survey conducted by Blair [11] found that little or no consideration had been given to the practice of accrediting learning through a range of life-place environments. The survey also found that where such environments had been considered in theory the learning was regarded as informal with little or no attempt being made to recognise or value it. It was further reported by Chisholm, and Blair [5], [6] that it was of fundamental importance to note that most of the

novel developments made in relation to paid work based learning environments has transferability to the life- place environments such as the home, the community and geographical locale. The research undertaken suggested that a useful way forward would be to recognise all informal or even unintentional learning through a quality assurance system which would facilitate assessment and subsequent credit. On this basis, they took forward the LPL model where informal and unintentional learning was quality assured, put through valid assessment and the award of credit made where desired.

As was indicated earlier, the recognition of personal and professional autonomy of the individual learner is of fundamental importance to the development of the LPL model. Luegenbiehl [7] usefully reported that while this concept has been widely adopted by western societies there is little evidence of the recognition of this concept in the traditional on-campus education of engineering and business students, where the curriculum is taken forward in a highly educator controlled learning environment that inevitably involves coercion of thought and action. This traditional learning environment does not provide a knowledge environment where the engineering and business learners can arrive at their own decisions and develop competence in independent judgement alongside a range of generic competencies. The case for personal autonomy in learning is strongly supported by the Kantian notion that „individuals are by their very nature as rational beings deserving of autonomy" from Luegenbiehl [7] and it would seem to the authors that this is also a skill that we would want our engineering and business graduates to master.

Earlier research studies by the authors revealed successful results where the learner was recognised as having personal autonomy to define and negotiate their derived learning outcomes across whatever range of life- place environments underpin their achievement of new knowledge, skills and competencies through explicit and tacit learning. Some learners who initially resisted this approach, due to perceived difficulty, reported at the end of their life-place studies that this was a superior way to learn when compared to the traditional on-campus approach. LPL as a model is usefully defined by Blair [6] as „Learning that encompasses knowledge, skills, behaviour and attitude, being acquired or to be acquired throughout life, irrespective of when, where, why and how it was learned".

4. SUSTAINABLE EMPLOYABILITY

The term employability has played a significant part in the revision of educational programmes to enhance the employability profile of the learner to ensure compatibility with the world of work. Sustainable employability is less about having a job, but more about having the requisite profile of skills, abilities, competencies and knowledge to enable the learner to obtain a job of choice. Employability as a concept is something with which, and in which, many of the current learners do not properly engage. In the mass education system which now exists many students come and complete a course but often without the focus of a planned career built around their choice. When a job becomes available it may well not be that of their career choice, particularly in an increasingly competitive global economy. With educators increasingly facing the problems of teaching an overcrowded curriculum at undergraduate levels, and dealing with a range of requirements from income generation to research, many staff have still to grasp the importance of personal development planning, career planning and the issues associated with sustainable employability. At the core of employability is the need for the curriculum to provide for the array of key skills and competencies that will underpin the learners in achieving a career of choice. We believe that key general skills and competencies described in the paper could be effectively achieved using the LPL approach combined with a range of extra curricula activities designed to support the already overcrowded discipline-based requirements of programmes of study. Employability is also about the global world of work, concerned not only with developing the required skills and competencies but also about developing competencies in the contexts of a global information society, social responsibility and social justice. Much of this is difficult to achieve in the restrictive on-campus environment. What is even more difficult is the integration of tacit and explicit knowledge, which we believe can only be achieved in the life-place environments discussed.

5. SUSTAINABLE GLOBAL GENERIC COMPETENCIES

The creation of the global society now taking shape is both an enormous challenge and an unprecedented opportunity for the engineering/business professions and the engineering/business educators. Co-operative product development, research and delivery of systems increasingly requires a global network which is functionally dependant on co-operation across many cultures, disciplines and

communities. This co-operation depends fundamentally on partners understanding each other's competencies within a global societal context. Today global organisations can be successful if their research departments can transform innovative ideas into new products more quickly and with less expense than their competitors. Global team building and working in global teams will facilitate achieving this, but global teams need their technical competencies to be integrated with the generic global competencies discussed to achieve the contextual approach needed to survive in the global information society. Quite apart from this, globally networked research can create a potential global knowledge base where complex competencies can be made available at a rapid rate. Thus these competencies can nucleate co-operation and understanding across different cultures, disciplines, races and languages where the communities of practice are competent to deliver on a techno-economic basis while exercising mutual respect and understanding of global diversity. This is the challenge facing educators who need to develop approaches to achieving the next generation of sustainable global competencies. But educators will need to develop the skills needed to drive these global competencies into place in programmes.

Global multicultural competency is a key direction which educators must now take as engineering and business graduates increasingly wish to sustain a global career. Educators have to clearly understand and keep under review what generic competencies students need to develop to work in an increasingly diverse world. Accepting that the engineering and business inputs to the curriculum are well understood, what is needed is an in depth understanding of the range of sustainable competencies which account for practice across the emerging global information society. Essential is a working knowledge of diverse ethnic groups and their associated cultures particularly in relation to inputs such as ethics, risk and safety. As was mentioned earlier another essential aspect is knowledge of social, political and economic issues and how these issues impact on race and ethnic relations across the global world. Above all it is clear that educators have a prime responsibility for teaching these diverse aspects to support personal and career development. What are the key aspects which educators need to develop? First and foremost they need to have flexibility to respond to and adapt to new and changing global environments to ensure sustainable global employability. Respect and values which take account of cultural diversity and ethics

are also an essential attribute. Emotional intelligence also has a key role in terms of developing empathy with other races and other cultures by listening and understanding their perspective. The third input involves key skills to underpin specifically living in a diverse global society. Above all is cross cultural communication involving verbal and non verbal communication skills. No matter how good an understanding an engineer has of the engineering technology, its implementation and successful development is directly related to competence in multicultural communication. Multicultural teamwork is also a key development which the educators must achieve, as within the global information society it is teamwork regardless of race, ethnicity or culture that is a key driver in seeking effective engineering solutions. Understanding diverse perspectives is also a key component alongside being able to provide leadership to a multicultural group. Educators can best develop awareness and appreciation of cultural differences across the world by taking a case study problem solving approach and as a starting point have students seriously examine their own cultural background and how that has shaped their attitudes and opinions. In educating the educators again this would form a useful case study approach for their development. This would help the educators to educate the students by ensuring they themselves understand their ethnic identity and how it influences identity development. At the core of achieving effective delivery of global generic competencies is the use of a learner's life-places which can involve both intentional and unintentional learning across a range of life-place off-campus environments.

6. LIFEPLACE LEARING: DEVELOPMENT OF THE MODEL

Successful research LPL studies were completed during the period 2003-2006. A project named Lifelearn was conducted to test the LPL model in Europe from 2006 to 2008 through the Socrates/Grundtvig E.U. programme [12] in collaboration with educational institutions in Germany, Estonia, Finland and Spain. The project was based on the LPL concept that individuals live the majority of their lives in a range of life place environments such as the home, the community, the workplace and social environments and that much valuable learning is gained in these various places. The objective was to formally recognise the learning that can be achieved in these life-places instead of driving all formal learning through the on-campus classroom and purely in a subject discipline fashion.

The aim was to see how the participants in each institution could capture these learning opportunities by structuring them to enable them to be compatible with formal learning frameworks but that the LPL developed would be in the context of their own educational system and culture. It was that success in this project would support widening access and social inclusion across Europe alongside recognising new forms of informal knowledge, inclusive of formalisation of unintentional learning. In this respect, the project in the longer term can be expected to make significant contributions to the European Qualifications Frameworks by facilitating the accreditation of informal skills, knowledge and generic and specific competencies achieved in life-place environments. We believe model supports an innovative, new and entirely novel practical route to support the achievement of generic competencies for engineering and business graduates.

LPL as a concept is not intended to replace the traditional learning model but to strengthen the learning system by integrating it with the on-campus model. While paid work-based learning over the past ten years has shown that off-campus learning can be successful, the LPL model, based on similar concepts, is much more radical and is concerned with exploring intentional and unintentional learning that occurs outside the formal work environment, arising from an individual's lifelong role in the home, community and the unpaid workplace. The partners in the Lifelearn project have worked collaboratively and trans-nationally to share ideas on how best to achieve the objectives and outcomes and develop and test a working infrastructure to measure and assure the learning involved. While it is accepted that the life-place model is a challenging concept, particularly to traditional educationalists, nevertheless it is the next logical step in off-campus learning.

The basis of the project was as follows:

• To review existing national practice in work-based learning and LPL to determine common European issues and approaches and trans-national good practice and provide staff with a common understanding of coaching, facilitation and mentoring.
• To plan and develop LPL models consistent with the target groups, including assessment methods, quality assurance systems and learning support utilising a range of media sources including support methodologies.
• To trial and evaluate LPL through the complementary range of modules/courses/ programmes with partners to document and disseminate as case studies.
• To complete an impact and evaluation of the LPL modules/courses/programmes in relation to learning by target groups, staff, pedagogical approaches, sustainability, quality assurance and the value of technology and other media based resources as support techniques and learning media.
• To disseminate and encourage interest in LPL in all sections of education nationally and trans-nationally to achieve sustainability.

A common approach was established at an early stage and this approach also provided a methodology to operate at a holistic level, recognising that life and learning are interconnected. It supported the move to trans-disciplinary learning which should provide an effective way forward for engineering and business educators who can use the mechanisms to achieve an effective and innovative way to establish the profile of generic skills and competencies to ensure sustainable employability.

The Lifelearn project involved innovative methods of assessment relevant to the LPL model and the outcomes show how effective these methods are on a trans-national basis. To date, the authors have found that permitting learners to negotiate assessment methods suitable to their own learning objectives, has proved to be highly effective. It is believed that this aspect will be of key importance if engineering and business learners are to achieve quality assured generic employability skills and competencies

Analysis of the data accumulated over the past two years gave rise to the following issues which needed to be resolved:

• How can the individual flexibility of the model be sustained while maintaining consistent quality standards?
• How best can consistent quality assurance systems be achieved that will ensure the confidence of educators, employers, learners and government?
• How can trans-national transferability be achieved across very different quality and educational systems?
• What process, techniques and support approaches can best assist the life-place learners?
• How can the use of technology be optimised to build and support communities of learners?

Answers to these core questions will support the strategy for future impact and sustainability of LPL for all levels of learners regardless of individual profile. It will certainly provide an effective way

forward for engineering and business learners to achieve a skills and competency profile relevant to employability at any given point in their career. The LPL model augments the traditional on-campus classroom model facilitating the development of competencies relevant to employability. As engineering and business professionals progress in their careers, a return to the classroom learning model is far from acceptable. Achieving relevant skills and competencies in their life-places, including their work places, is much more liable to be acceptable and provide the right levels of motivation to ensure sustainability of employment of choice. We also anticipate that the life-place project results will contribute to extending trans-national learner opportunity. In the new evolving European and global knowledge-led society the knowledge worker increasingly requires learning to be life-long and take place in real world trans-disciplinary environments where key skills and competencies can be gained. This is particularly true for engineering and business learners who continually need to update on a life-long basis. The opportunity to engage in The LPL model based on the earlier research by Davis and Chisholm [13], is now authenticated by the outcomes achieved from the Lifelearn European project.

7. LIFE-PLACE LEARNING – EXPERIMENTAL WORK AND RESULTS

The Lifelearn project was hosted by the School of Engineering and Computing (lead partner for the Lifelearn project) at Glasgow Caledonian University, Scotland. Earlier research and the recently completed research within Lifelearn at Glasgow was based on students completing LPL modules as part of a negotiated BA/BSc degree programme. The life-place modules were available at all four levels of undergraduate study in the Scottish system. The content of a module was based on negotiation between the learner and the facilitator (staff member) but was clearly learner-led with the content being based on past experience and/or current life - place roles and/or new learning goals. The learner was able to propose the topic to be covered, the syllabus, the learning modes and the assessment strategies, subject to the approval of the facilitator. The outcomes were in accordance with the current Scottish Qualifications Framework level requirements for study, at either level 1, 2, 3 (Degree) or level 4 (Honours Degree). The learner had to complete a personal module descriptor, relevant to the appropriate level. The content of the module descriptor contained the following:

- An overview of learning from past experience
- A description of the student's current roles and responsibilities and the learning arising from them
- The student's anticipated future roles and responsibilities and the learning required to carry them out
- The subject area and the rationale for its choice
- A defined aim or research question
- The intended outcomes to be achieved during the module
- The syllabus (content) of what will be studied in the module
- The research/investigation methods and data analysis methods
- The assessment methods and marking criteria
- The level of facilitative support and assistance required
- A plan for completion and execution of the learning contract

Modules were of fifteen weeks duration and learners were encouraged to choose an area of learning that had implicit value for them and that would assist them with their own personal and professional development. The mandatory parts of the assessment were two assignments, each worth 15% of the final mark for a given module. One assignment related to the completion of the personal module descriptor and the other related to the completion of a reflective analysis of the learner's unintended learning deriving from the studies carried out to achieve the module outcomes.

As can be seen, the learning was primarily learner-led, directed, managed and assessed but there was facilitative support in the form of mentoring, coaching and facilitating to assist the learner in completing the module. A novel outcome built into the modules was that of recognising any unexpected but relevant and valuable learning consistent with the goals of the module.

Around ninety students have undertaken the LPL modules at Glasgow, covering a very wide range of subject matter and an extensive range of outcomes. The studies varied from levels 1 to 4 in the BA/BSc programmes and the results to date clearly show how the LPL model supports students in devising their own negotiated learning in a life place environment other than the traditional on-campus classroom learning environment. While the content of some of the modules was subject specific, many of the topics related to more generic development of skills and competencies. The vast majority of the learners found the experience stimulating and

enjoyed the learner-driven approach. Some learners initially found the concept difficult but by the end of the module, they indicated how their views had changed as they had progressed. The recent results obtained in the Lifelearn project again confirm these views. The learners utilised both past and current experience alongside future skills requirements in completing the modules. The results to date provide conclusive evidence that life-place learning can be accredited, effectively assessed and credit awarded.

8. DISCUSSION AND CONCLUSIONS

The LPL model developed offers learners in engineering and business a facility to achieve learning in any life environment which can be recognised, assessed and given credit which could (but need not) contribute to a qualification such as the accumulation of desired generic competencies. With the now growing emphasis on the need for competencies to underpin sustainable employability the LPL model offers an effective and sustainable way forward. Our research to date has clearly shown the value of the LPL environment approach and with the evidence deriving from around ninety students successfully completing LPL as part of an accredited negotiated degree we believe this is adequate evidence of the effectiveness of the approach.

Learners reported on how this method of learning developed their individual autonomy as learners which again was evidence that LPL supports development of competence in independent judgment as regards the overall learning experience. The authors are convinced from the work completed to date, that the LPL model has transferability from Europe to worldwide although it would be expected that the transferability would need to make allowances for significant cultural differences. While it is beyond the scope of this paper to detail and consider how the complete range of employability competencies can be delivered using the LPL approach it can be easily seen from the earlier detailing of the model how learners can choose to deliver a range of generic and / or specific competencies using any environment in which they live to the benefit of themselves and their employers.

What was found to be of direct interest in terms of results was that learners can chose a leisure environment/activity, such as watching television in the home to fulfil the requirements of generic or specific learning and then at a later date through in-depth reflection on the issues raised within the programmes (even if a fictional programme), they can show that they have achieved a number of generic skills that can then be assessed and credit

awarded at a given level, by using the LPL model. The subject matter of the television programme is not the focus in such studies, it simply being the vehicle through which the generic skills and competencies are achieved. It is a powerful illustration of how unintentional learning in a leisure environment can later through reflection be formalised and measured. This creative and novel approach will of course require educators to accept a significant change in mindset if they are to become facilitators of this form of learning.

The overall conclusions are as follows:

- Development of LPL to date has led to a model which supports learning in trans-disciplinary life environments, delivering mixtures of subject-based learning, skills and generic competencies.
- LPL facilitates learning through having personal and professional autonomy at the core of the learning model.
- LPL offers an ideal vehicle for engineering and business graduates learners at any educational level to achieve a range of employability competencies and skills through real world environments thus relieving the pressures on already overcrowded on-campus curriculum.
- LPL has transferability from Europe to Worldwide as a new and novel learning approach that facilitates informal and non-formal learning being recognised through assessment and the award of credit.
- Further evaluation of the model across Europe should lead to modifications and refinements of the earlier research which will further facilitate the interpretation and establishment of LPL in a European context.
- The results and testing to date provide valid evidence that the life-place approach could sustain the personal and professional development of engineering and business professionals to continuously update their employability competencies and skills as they progress through their careers without having to return to an on-campus environment.
- Multicultural competency development is now essential if future generations of engineering and business graduates are to be effective in the global information society.
- A model is proposed for the approach to global generic competencies which takes account of race, ethnicity, culture, ethics and language.
- A portfolio of generic competencies is proposed for development within the context of the developing global information society.

- The establishment of a social responsibility mindset is considered fundamental and mandatory to the successful development of global competencies and a successful career with sustained employability.
- Educators need to move forward by taking a case study problem solving approach to self development to become effective in taking forward generic competence development using off-campus environments.
- Using a range of life-place environments could considerably enhance the effective realisation of generic competencies within a global context.

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