Blended Learning in Support of Life-long Learning for Surveyors

David MITCHELL, Australia; Winnie SHIU, Hong Kong SAR; Stig ENEMARK, Denmark; and James KAVANAGH, United Kingdom.

SUMMARY

"Blended" or "hybrid" learning is a significant trend in professional surveying education. It involves a mix of face-to-face learning and online learning. While blended learning is challenging to implement it offers many benefits and, when carefully developed, provides a range of learning options that suit many student learning styles and approaches. A key characteristic is that digital learning or training materials can be shared and easily adapted for use in many contexts.

The benefits in blended learning for life-long learning is enhanced if education institutions, government, industry and professional institutions work together to develop online learning opportunities. It all starts with quality online learning materials that can be used in many ways by many stakeholders to provide options for life-long learning pathways that are then incorporated into traditional face-to-face approaches suited to the context.

In this paper we discuss the development of blended learning in academia, training institutions and professional institutions. The paper draws on the experiences of the authors and existing literature to review and discuss the trends in blended learning and consider how this may be of benefits to learners in academic institutions, as well as for training within the surveyor sector, and the benefits for professional development programs. Finally, we consider ways that academic institutions, training organisations, industry and professional bodies can work together to derive efficiencies and combined benefits of blended learning resources.

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INTRODUCTION

Disruptive technologies like the Internet of Things (IoT), Big Data, and Artificial Intelligence (AI), as part of what is being considered the fourth industrial revolution, are having a major impact on how we learn. This is particularly evident in the surveying profession with rapid advancements also in sensors and point clouds, laser scanning, and blockchain. The fourth industrial revolution will therefore affect the jobs and roles that surveying students will face when they graduate and influence the nature of their professional development and life-long learning. Therefore, higher education institutions must prepare graduates for working in this technologically transformed age, and industry and professional associations must support graduates in continually updating their professional skills (Markus 2006, Lam 2008, Ssengendo 2012, Sutanto et al 2017).

Professional surveying education will need to allow students to fully engage in these disruptive technologies, personalised data, and global connectivity. Students now typically expect learning opportunities anytime and anywhere including remote and self-paced options. It is likely that higher education and professional development will head towards offering learning specifically designed for individual learners. It is also likely that some learners will be able to build their own learning package by choosing their education tools – whether within academic institutions or through continuing professional development. One example of this is the ESRI academy, launched in 1997 and now allowing learners to create their own learning plans to learn about a focused ArcGIS topic at their own pace (Esri 2019). However, traditional face-to-face instruction will remain a key element of this development in education.

The concept of "blended learning" was first introduced in corporate training and involved combining online instructional technology with actual job tasks for more harmonious learning and working (Driscoll 2002, Partridge et al 2011). The models developed in industry have informed the adoption of blended learning in higher education (Partridge et al, 2011). There is also a significant trend in surveying higher education towards "blended" or "hybrid" learning that involves a mix of face-to-face (F2F) learning and online learning.

In the context of this paper we consider blended learning to mean the thoughtful integration of face-to-face and online learning experiences. According to Garrison and Vaughan (2008), the basic principle is that traditional face-to-face communication (lectures, tutorials, labs, practical sessions) and online written communication are optimally blended into a unique learning experience that meets the intended educational purpose and the context (Garrison and Vaughan, 2008).

In practice, blended learning is costly, time-consuming and professionally demanding to implement effectively. Both academic institutions and professional industry bodies have found blending F2F and online resources challenging.

However, student approaches to learning are changing with an expectation of being able to access learning materials any time of the day or night and from any location. Students are also increasingly turning to technology to learn. These include online assistance, videos, students' discussion forums, and web or mobile apps such as ANKIWeb. It is the opinion of the authors that blended learning is the future of both higher education and professional development, and indeed there has already been a lot of development in this area. Blended learning offers many benefits and, when carefully developed, provides a range of learning options that suit a range of learning styles and approaches. A key characteristic is that digital learning or training materials can be shared and easily adapted for use in many contexts, and learners can access the materials at the time and location that suits them. The f2f element then draws on the online content to bring the learning.

There are many blended learning models and frameworks that can be used to design and implement blended learning in higher education. Driscoll (2002) summarised these as a combination of (i) different modes of online technology, or (ii) various pedagogical approaches (ie not related to technology), or (iii) any form of instructional technology with face-to-face instructor-led training.

Each academic discipline has different learning objectives and so there can be more than one correct approach (Partridge et al, 2011). A key question then is *what does blended learning mean for surveying higher education*? Experience of the authors suggests that while surveying students[1] have diverse learning approaches and needs, they are typically responsive to "active" and "problem-based" learning approaches. Traditionally this has involved lectures supported by tutorials and computer lab sessions and field practical projects to bring together the theory and practice of surveying. While this traditional approach often was effective, it involved developing lecture materials for each session that were not shared, which took a lot of effort for each session. Blended learning approaches allows us to re-use learning materials many times in many ways and by many institutions.

Accordingly, our observation is that common blended learning models being adopted are typically the first (completely online delivery), and third (online and F2F delivery), of the approaches mentioned by Driscoll above. We also anticipate that the blending of online and F2F delivery will continue to develop and improve as the higher education sector becomes better at 'blending' these modes of delivery to achieve optimal learning outcomes.

At the same time continuing professional development is improving their 'blending' of online and F2F offerings with an ever-increasing number of online resources to complement the more traditional seminars and conferences, supported by industry training. All this helps to support the aims of life-long learning for students and graduates. However, changes are affecting the operation of surveying practices, their management and their professional structures under the challenges of widening professional activities and a changing world (FIG Commission 1, 2019). The greatest challenge facing the global surveying profession without any doubt is one of capacity, and analogous to this is a growing issue of professional and technical competence within the current professional surveying cohort. In the UK for example, the vast majority of regulatory complaints against chartered surveyors (RICS) are focused on competence, conduct and professional behaviour issues. There is an evolving need for surveyors to be trained (or

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[1] Here we use "surveyor" broadly as defined in the FIG Definition of surveyor…

indeed retrained) in 'soft/life' skills that enable them to work, communicate, interact and provide a higher level of service to the general public and clients.

Therefore, a second question emerges - *how can the blended learning model support cooperation and synergies between surveying higher education and industry CPD to support life-long learning*?

The paper draws on the experiences of the authors and existing literature to review and discuss the trends in blended learning and consider how this may be of benefits to learners in academic institutions, as well as for training within the surveyor sector, and the benefits for professional development programs. Finally, we consider ways that academic institutions, training organisations, industry and professional bodies can work together to derive efficiencies and combined benefits of blended learning resources.

WHY IS BLENDED LEARNING SUITED TO SURVEYING?

Modern learners are more likely to seek information online, and for it to be available anytime and anywhere. Surveyors are no different. While it is important to understand that any class or cohort of learners contains people with very different approaches to learning, we can make some broad generalisations about what makes surveying students different from other professions and disciplines.

Surveyors tend to be very practical people, with a reputation for being good at problem solving and project management and in the adoption of technology. They are perhaps less likely to enjoy class discussions than other disciplines. They are more likely to want to do things rather than talk about them.

Students tend to respond very well to approaches such as *'problem-based'* learning and *'active'* learning. Surveying students also tend to respond well to examples and case studies from the real world (ie industry). As a result, there is a long history of industry professionals and practitioners being involved in teaching of surveying students through providing guest lectures, supporting field practical projects and providing advice on the use of new technology.

Teaching and training in surveying has traditionally been based on a 'blend' of theory and practical tasks (lectures, training, tutorials, computer lab sessions, field practical exercises, and computing sessions) supported by practical experience in industry. What is now often call *'Work Integrated Learning'* (employment in surveying while studying) has been common in professional surveying education.

So, while there are many different types of surveying learners, blended learning, therefore offers a way of learning that suits many surveying students. This is especially true where the blended learning involves input from both academics and industry in the content and learning materials. Blended learning can help meet the modern need to provide online and f2f learning opportunities anywhere and anytime, as well as providing many opportunities for problem-based or active learning.

Problem-Based Learning

The only constant is change. In an educational context, this is the main challenge. Therefore, the educational base must be flexible. The graduates must possess skills to adapt to a rapidly changing labour market, and they must possess skills to deal even with the unknown problems of the future. The point is, that professional and technical skills can be acquired and updated at a later stage in one's career while skills for theoretical problem-solving and skills for learning to learn can only be achieved through the process of academic training at the universities.

These challenges can be met by adding a potential component to the concept of blended learning in terms of Problem Based Learning (PBL). This will change the profile of university education from mainly classroom teaching, over guided self-learning to include also the dimension of "Learning to Learn" through project-organised assignments. This conceptual approach could be termed "Hybrid Learning" by combining the various kinds of learning modes into an integrative learning concept that should fit very well to the interdisciplinary context of surveying education.

An interdisciplinary approach to surveying education calls for the need to address issues and problems in a real-world context. The combination of different disciplines can be taught through a "learning-by-doing approach". Problem solving skills can be taught through a project-organised approach to surveying education with a focus on developing skills for "learning to learn". At Aalborg University, Denmark, such and project-organised and problem-based approach has been applied since establishing the university in 1974 (Kjaersdam and Enemark, 1994).

Project-organised means that traditional taught courses and labs is replaced by project work assisted by lecture courses. The project-organized concept moves the perspective from description and analysing into synthesizing and assessment. This approach is based on a dialectic interaction between the subjects taught in the lecture courses and the problems dealt with in the project work. The project work is carried out by groups of four to six students having a teacher appointed as their supervisor.

Problem-based means that traditional textbook-knowledge is replaced by the knowledge necessary to solve theoretical problems. The problem-based concept moves the perspective from understanding of common knowledge into ability to develop new knowledge. The aim of the project work is "learning by doing" or "action learning". The project work may be organized by using a "know-how" approach for training professional functions (Bachelor level), or it may be organized by using a "know-why" approach for training methodological skills of problem-analysis and application (Master level).

Educational innovation can then be achieved by being aware of the necessary dialectics between discipline and problem-based/project organised education. The disciplines and their related theories are necessary for the graduates´ fundamental academic and professional basis. On the other hand, the problem-based project work is necessary in order to understand the interdisciplinary character of the problems as they appear in real life in industry/society.

A number of research studies have confirmed that students retain only 10 per cent of what they read and only 20 per cent of what they hear. However, if a problem is simulated, then up to 90 per cent of the lessons learned may be retained. This finding is behind the shift in the

pedagogical doctrine toward project-organised and problem-based learning. It emphasizes learning instead of teaching. Learning is not like pouring water into a glass. Learning is an active process of investigation and creation based on the learners` interest, curiosity and experience and should result in expanded insights, knowledge and skills.

A consequence of this shift from teaching to learning is that the task of the teacher is changed from the just transferring knowledge into merely facilitating the learning process. Project work also fulfils an important pedagogical objective. Student must be able to explain the results of their studies and investigations to other students in the group. This skill appears to be vital for professional and theoretical cognition: Knowledge is only established for real when one is able to explain this knowledge to others.

Professional learning communities

Another benefit of blended learning relates to establishing what could be termed "Professional Learning Communities. This is about making the on-line learning material developed for the teaching and learning process at the universities freely available for the profession as a basis for knowledge upgrading and CPD / life-long learning activities. At the same time, experts from professional practice can contribute to provide the university learning document / knowledge base. This kind of interaction between education and professional practice aims at professional innovation in the longer term (Enemark and Sorensen, 2002).

The on-line learning documents or knowledge bases need constant updating to ensure that the newest knowledge at applied and made available at all times. This is a challenging and time-consuming task while highly relevant in relation to university training as well as CPD activities. As a result, the graduates will have access to newest professional knowledge throughout their professional life whether in the public or the private sector.

Even if the on-line learning material / knowledge bases are designed for the students´ learning process, it should also provide a comprehensive source of knowledge to be used by professionals. This calls for a process of quality control almost comparable to the review process used for publishing scientific articles in professional journals. The result will be the creation of a kind of Professional Learning Communities. In a CPD and lifelong learning perspective, this would be highly valuable and well in line with the FIG policy statement on this issue (FIG, 1996).

DEVELOPMENTS IN BLENDED LEARNING IN SURVEYING

Blended learning can help address issues with education and professional development pathways, entry requirements, career development, and may improve student enrolments. It is consistent with the way that Generation X, Y and Z access information and network and communicate.

Becoming a life-long learner requires continual development of knowledge, skills and values. Employers consider graduates with the soft skills such as critical thinking, creativity, communication, teamwork, are more employable. Development of these graduate attributes may be improved with more student-centered learning strategies (Kelly, 2019).

Providing quality life-long learning opportunities for surveyors is the responsibility of all stakeholders, including academic institutions, industry, government, and professional institutions. The need for this is acknowledged through requirements for CPD related to membership of professional institutions. However, what strengths do each of these stakeholders bring to these learning opportunities?

Continuing Professional Development and Life Long Learning

FIG Commission 1 seeks to build the capacity of professionals to adapt to changing circumstances. Commission 1 has a long-established interest in professional ethics, professional development and mutual recognition. The mission of Commission 1 (Professional standards and practice) includes to (i) create a community of practice to share knowledge about professional standards and practice challenges and responses by surveying professions, (ii) support professional surveyors by providing tools and approaches to dealing with common practice issues, and (iii) develop individuals as professional surveyors and provide opportunities for them to continue to develop as part of the surveying community (FIG Commission 1, 2019).

FIG sees the importance of free movement of surveyors in a global marketplace. The mutual recognition of professional qualifications provides a means whereby profession qualifications held by individual surveyors can be recognised by individual professional organisations as comparable to those acquired by their own national surveyors - see also the FIG Policy Statement on Mutual Recognition of Professional Qualifications (FIG, 2002). We shall promote the principle of mutual recognition of professional qualifications by:

- encouraging communication between professional organisations to ensure a better understanding of how surveyors acquire their professional qualifications in different countries;
- developing with professional organisations where difficulties are identified in achieving mutual recognition, and encouraging debate at national government level in order to remove such difficulties; and
- working with external organisations, such as World Trade Organisation, in order to achieve mutual recognition in both principle and practice of professional qualifications for surveyors world-wide.

Mutual recognition between national and regional professional surveying bodies tends to be unilateral by nature. The experience of RICS has been generally confined to the anglophone Commonwealth where a shared legal, language and professional qualification system has enabled RICS to develop Direct Entry and Memorandum of Understanding (MOU) with a wide range of national surveying bodies. Of course, it is still necessary to map/crosscheck professional competencies, qualification routes and academic standards but the process is mutual. A listing of Direct Entry agreements can be found at https://www.rics.org/uk/surveying-profession/join-rics/chartered-member-mrics/ The most recent have been finalised in Australia (Australian Property Institute API), Ghana (a renewal of the DE with GHIS) and Canada (Canadian Land Surveyors/Hydrographers). Mutual recognition is a good way of extending professional practice and learning from each other.

Industry and professional institutions also have a strong role to play in life-long learning. Industry and government provide industry-relevant perspectives and the current thinking about practice. Industry practitioners can ensure the relevance of learning to meet the current needs of employers. Engagement of industry in f2f aspects of blended learning is appreciated by surveying students.

They also have incredibly rich examples and knowledge that can feed into blended learning resources through case studies and instructional advice to learners. These 'real world' case studies help bring the theory to life for the students.

The Hong Kong Institute of Surveyors (HKIS) requires candidates being assessed for Professional Competence to produce a synopsis of a minimum of 20 hours of Pre-qualification Structured Learning throughout the 2 years training period. With six disciplines of surveying including Building Surveying, General Practice Surveying, Land Surveying, Planning and Development, Property and Facility Management and Quantity Surveying, candidates may choose from a mix of professional seminars organised by the HKIS, learning activities related to their respective surveying industry provided by professional bodies, higher education programmes and special or in-house staff training courses, and private studies or web-based self-learning related to the respective surveying disciplines. Owing to the nature of work of the surveying profession, in which practical skills are required to demonstrate the competency, only 5 out of 25 hours can be on web-based learning.

The Hong Kong Special Administrative Government provide 2 years graduates training scheme for the selected surveying graduates with hands on practical training. In the case for land surveying graduates, they would firstly be provided an introductory training at the survey training school, followed by posting to various offices for the practical training. Each of them will at least be rotated to two offices with different nature of work so as to expand their knowledge during the training period. All members of HKIS also organised a large number of CPD events for members as part of life-long learning. Will this be expanded to cover web-based? That will require additional funding resources as most professional institutes survive on members' subscriptions for running the institute. However, with the availability of advanced technology, this can certainly be looked into though the initial set up cost could be high, but the recurrent should be less in the long run. With the recent unexpected COVID-19 virus affecting most countries, the use of online learning for delivering CPD events will certainly help maintaining the life-long learning.

RICS have developed a five-month "*APC Accelerated Learning Course for Project Management*" for RICS members, using blended learning principles. This course involves six content modules with each covers a competency required by the profession. The blended learning involves both online learning content and interactive sessions aimed providing a thorough grounding of the required technical knowledge of each competency. Each competency also has a face-to-face consolidation session for students to demonstrate knowledge and personal feedback from an assessor (RICS, 2019). The blended learning format above is in stark contrast with a lot of other online training provided by RICS, although RICS is moving towards using a 'blended' learning concept for dispute resolution and specialist expert schemes. Mediation, especially evaluative mediation is a good example. This intensive 5-day course requires a professional surveyor to be present in a classical classroom scenario and also use video recording critiques, workshops, role playing and basic interviews to complete.

RICS is also starting an expert boundary specialist scheme in conjunction with lawyers and the judiciary. This will require a member to be expert in surveying and land law, and be trained as a mediator and expert witness. If anything, the hard technical skills of a classically trained surveyor will take a backseat to a more rounded training with interpersonal, conduct and behavioural skills to the fore. Indeed, RICS professional standards and guidance is embedding these issues within the context of more technical processes.

The UN-GGIM Academic Network has also recognised the benefits of developing e-learning materials and is planning to establish an *Online Training Platform* (OTP) for Education, Training and Research. Through an OTP operator supported by an advisory committee, the OTP will provide resources for the UN-GGIM Academic Network academic members, academic staff and students.

Higher education

FIG Commission 2 (Professional Education) has a strong interest in advances in professional education and Continuing Professional Development – see (FIG, 1996) . Commission 2 seeks to encourage improved surveying practice through the promotion of continuing professional development (CPD) and the practical application of research, help surveyors continuously to update their academic and professional profiles. FIG also have a strong focus on e-learning as presented in (FIG, 2010)

What higher education contributes to life-long learning is education 'values' and 'approaches' (pedagogy, assessment strategies, matching students development level). As survey graduates, we all forget how much we didn't know when we were undergraduate students, and this is a challenge for anyone designing learning materials. A key role of higher education in blended learning, therefore, is to match the learning materials to the stage and level of learning as illustrated in Figure 1. Blooms Taxonomy provides guidance on this.
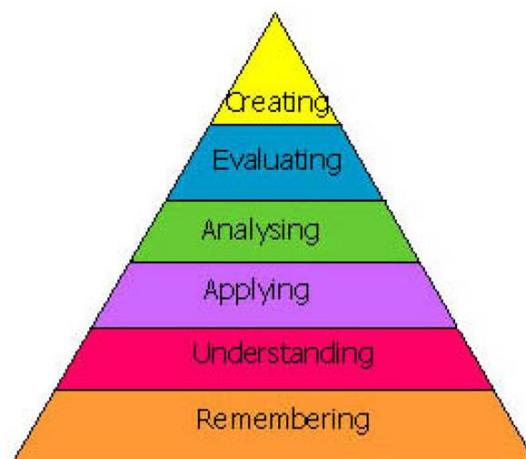

Figure 1 Revised Blooms Taxonomy for classifying levels of thinking (Forehand, 2010).

The role of higher education in blended learning is to engage with the digital tools constructively so that student learning is enhanced. Higher education institutions also undertake research into the new disruptive technologies or approaches mentioned earlier (IoT,

Big Data, AI, blockchain, etc) and offer learning about the future role of surveyors as well as the current role of surveyors.

The development of some type of blended learning is common in surveying courses, and the blending of online and f2f is becoming increasingly more effective. In the surveying program at RMIT University, all courses include online material on the learning management system Canvas, and all lectures are video captured allowing students to watch the video at a time of their choosing. In the cadastral surveying classes for example, f2f class time includes active-learning that can also use some form of online information or tools.

A recent example of this is the GLTN project on building a structured knowledge base in support of responsible land administration - Responsible Land Administration Teaching Essentials (GLTN, 2019) – which was launched in a paper published at the 2020 FIG Working Week. The project included six modules addressing various aspects responsible land administration and is now freely available in Beta version for any organisation to adapt and include in their curriculum, or training or CPD program. This adaptation may include, for example, the development of local case studies to help illustrate the global principles outlined.

In another example, RMIT University is in the early stages of discussion with industry partners to develop an online resource that documents the fundamental approaches to undertaking rural cadastral surveys. The proposal is to develop an online resource including videos, photos, images and text, for a case study that takes students through the thinking that experienced surveyors would use to search surveying and title records for that site, look for ground marks, plan their connection to the geodetic datum, and complete the title reestablishment. This is a challenging task and requires professional instructional design starting with the development of a "storyboard" that plans the key learning objectives and describes the overall story to be told. If carefully designed, some aspects of this resource could be designed specifically for undergraduate learners, with more advanced aspects of the resources useful for graduates who are attempting to become licensed cadastral surveyors.

There are several papers in the 2020 Working Week proceedings covering their experiences and challenges in adopted e-learning and blended learning. For example, the Department of Urban and Regional Planning and Geoinformation at the University of Twente reviewed their experiences in e-learning. This review highlights the gradual and consistent move towards e-learning and blended learning and the increase in the use of video (Groenendijk et al, 2020). Valentin et al (2020) also provide examples of incorporating MOOCs with f2f learning in the fields of photogrammetry and mobile mapping.

Microcredentials

Microcredentials (or digital badges) allow learners to demonstrate the skills, knowledge and competencies they have developed. This could be through undertaking training, attending seminars with an assessment component, adult and community learning, professional examinations, apprenticeships, work-based learning, boot camps and completing Massive Open Online Courses MOOCs, or other forms of online learning. Microcredentials or alternative credentials can certify that a learner has completed small units at an accredited higher education institution, or outside activities that provide useful learning, or completion of an assignment related to a seminar, for example (Mischewski, 2017).

They are an alternative to higher education qualifications and can be used to make decisions about mutual recognition and recognition for prior learning. In other words, they can be an important part of providing a range of recognised pathways for life-long learning.

The concept of microcredentials is helped by a trend in using competency-based learning models and can help to address potential skills gaps in degree graduates. For example, see the paper by Roy (2020) on the use of competency-based approach being used at the University of Laval in Quebec. They also provide alternative pathways for surveying professionals to upskill and upgrade their knowledge. They are on the agenda of higher education and a study of higher education institutions in the USA found that 94% of surveyed institutions offered alternative credentials (Fong et al 2016).

Micro-credentials allow learners to organise their individual learning into a larger qualification, including using RPL where appropriate. They also can also be used to show evidence of the 'soft skills' that are valued by employers. *Grading Soft Skills* is an EU funded multinational project to test approaches to develop and assess 'soft' skills (e.g. working with others, problem-solving, and creativity) and enable the accumulation of relevant credentials over time. Also, the Colorado State University has digital badges for skill sets such as essential employment skills. However, it can be challenging implementing Micro-credentials as they are complex and expensive (Milligan 2017), and there can be concerns about their legitimacy, credibility (Wilson 2016). Successful use of micro-credentials means meeting the needs of employers and leaners and being able to provide assurance the quality of learning, and be easy to use (Wilson 2016, Mischewski, 2017).

DISCUSSION AND CONCLUSION

### What Is Life-Long Learning Like for Surveyors in the Future?

Surveyors will have opportunities to gain recognition for their skills, knowledge and competencies at all stages of their career, from when they commence study or work, and throughout their career by updating of their skills through professional development.

Learners of all types and abilities will find a life-long learning pathway that suits their particular way of learning and will have a choice of blended learning plans that allow them to access online learning materials anytime and anywhere. They will also be provided with flexibility about when they complete the face-to-face elements. Recognition for prior learning (RPL) will be an integral part of this life-long-learning pathway where micro credentials or digital badges are recognised where relevant to the learning pathway.

These stages of a surveyor's career can be grouped in four phases as shown in Figure 2:

1. Student Surveyor: Stimulating learner engagement, awareness, and understanding of the opportunities presented by surveying...
2. Graduate Surveyor: Providing specific skills and competencies that support membership of professional institutions.
3. Upskilling Surveyor: Accelerating learning of advanced concepts.
4. Expert Surveyor: Ongoing professional development for surveyors with an emphasis on developing soft skills in conjunction with maintaining technical competence
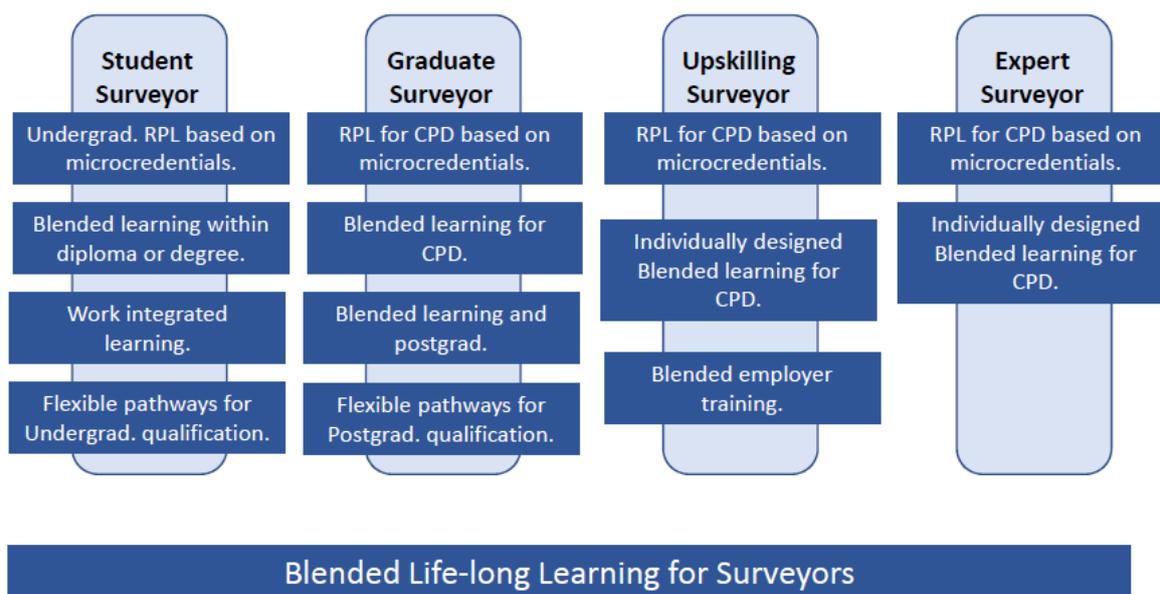
Figure 2 Blended learning at different stages of life-long learning

Blended learning should be designed for the level of development of the learner at each stage of development throughout their surveying career. Blended learning is challenging and costly to do well. To achieve this vision for surveying learners, academic and training instutions, professional bodies and government will need to work together effectively to benefit their combined strengths.

Ways forward

Experience over the last few decades tells us that effective blended learning requires long-term investment and careful design of the learning outcomes. In practice it often starts with small investments in online resources, that improve and develop over time.

Effective learning starts with understanding the strategies the learner uses and drawing on Blooms Taxonomy to design learning materials to match their learning needs. In response, FIG Commission 2 is implementing a global questionnaire to assess the learning approaches and strategies of Generation Y and Z students. This questionnaire aims to increase our understanding of the varied ways that surveying students learn and communicate (including their main motivations - providing flexibility of time and place, efficiency of accessing information, etc), and the degree they focus on life-long learning. This is about their learning styles and strategies and includes formal learning (within the University) and informal learning (outside of class time). The global distribution of the questionnaire will allow comparative analysis of gender differences, as well as regional differences.

The benefits in blended learning for life-long learning is enhanced if education institutions, government, industry and professional institutions work together to develop online learning opportunities. It all starts with quality online learning materials that can be used in many ways by many stakeholders to provide options for life-long learning pathways, that are then incorporated into traditional f2f approaches suited to the context

Flexibility of study pathways

What is possible is to head towards the personalisation of learning. In other words, designing individual or personalised learning programs that suit different types of learners. In theory, learners can access a range of face-to-face ad online offerings that suit their particualr learning style and count towards their degree, or training, or CPD points.

Blended learning can also help the delivery of bridging programmes (for example between secondary and higher education, or between diploma and degree) focussing on a particular topic such as mathematics. High quality foundation and bridging programmes help prepare students for further study. Research suggests that students who complete these programmes perform at least as well as other learners (Mischewski, 2017). Other learners require more targeted assistance and specially designed support can provide effective preparation. In either case blended learning resources can be developed and shared to suit a variety of professional development needs.

Recognition for Prior Learning

This can be further facilitated by provide flexibility in the Recognition for Prior Learning (RPL). For example, a student may come into a higher education program with some microcredentials for some online training they completed, and also for a relevant MOOC. They may also have completed CPD programs that are relevant. The potential exists for these to be recognised as RPL allowing the student to commence later in the program. Or, a person attending a seminar on a relevant topic can complete and assessment task and gain a microcredential for this that can satisfy part of their CPD requirements.

Improved CPD and Life Long Learning

Improving the number and type of offerings for higher education, and training and professional development can facilitate an overall increase in the engagement of learners in education and professional development and a higher completion rate of offerings. This leads to an overall increase in the quantity and quality of life-long learning.

Conclusions

The paper draws on the authors experiences and literature to review and discuss the trends in blended learning and consider how this may be of benefits to learners in academic institutions, as well as for training within the surveyor sector, and the benefits for professional development programs. The educational base must be flexible to respond to the changes happening and graduates must possess skills to adapt to a rapidly changing labour market, and they must possess skills to deal even with the unknown problems of the future. Professional and technical skills as well as theoretical problem-solving and skills for learning to learn can be met by blended learning using Problem Based Learning (PBL) approaches. This will change the profile of university education from mainly classroom teaching, over guided self-learning to include also the dimension of "Learning to Learn" through project-organised assignments.

A benefit of blended learning relates to establishing what could be termed "Professional Learning Communities. This is about making the on-line learning material developed for the teaching and learning process at the universities freely available for the profession as a basis for knowledge upgrading and CPD / life-long learning activities. At the same time, experts from professional practice can contribute to provide the university learning document / knowledge base. This kind of interaction between education and professional practice aims at professional innovation in the longer term. The benefits in blended learning for life-long learning is enhanced if education institutions, government, industry and professional institutions work together to develop online learning opportunities. It all starts with quality online learning materials that can be used in many ways by many stakeholders to provide options for life-long learning pathways, that are then incorporated into traditional f2f approaches suited to the context

Experience over the last few decades tells us that effective blended learning requires long-term investment and careful design of the learning outcomes. In practice it often starts with small investments in online resources, that improve and develop over time.

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