Supporting Lifelong Learning and Education of Geomatics Professionals

Steve Y. W. Lam

Abstract

Human beings are born to be lifelong learners by having the basic need to learn how to survive, be employed and enjoy life in various forms of learning and education. This paper presents the international trends of lifelong learning for geomatics profession with discussions on: (1) the reasons, aims, forms and quality requirements of lifelong learning; (2) how to organize the learning in views of formal and non-formal education, and social/situated learning; (3) what geomatics courses are demanded by the profession and learners at large; (4) making policy work under the balanced welfare and market-oriented model.

Keywords: lifelong learning, education, geomatics, policy.

Perspectives on Lifelong Learning

'Lifelong learning' is defined as all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competencies within a personal, civic, social and/or employment-related perspective (EC, 2002). Such learning is being undertaken under formal or non-formal education within or outside educational institutions (Table 1), or under informal learning which may take place at individual level (e.g., self-directed learning) within family or by visiting cultural events. The lifelong-lifewide learning framework has two dimensions, namely the lifelong (or longitudinal) dimension of learning period from cradle to death and the life-wide (or cross-sectional) dimension of different settings or learning areas.

Why lifelong learning? What are the international trends of lifelong learning? According to (Jarvis, 2004), discourses of lifelong learning and education are shaped by: (1) globalization of production and employment; (2) social justice and cohesion; (3) educational settings and reform that cater for the diversity of individuals' learning goals, learning styles and learning situations; (4) government's education policy that supports lifelong learning.

Thus the principal aims of lifelong learning and education are to promote production and employment, social justice/cohesion, individuals' achievements, and good citizenship by implementation of the following educational strategies and policy (EC, 2002):

1. To ensure that people's knowledge and skills match the changing demands of jobs and occupations, workplace organization and working methods.
2. To build an inclusive society which offers equal opportunities for access to quality learning throughout life to all people, and in which education and training provision is based first and foremost on the needs and demands of individuals.
3. To foster individuals' capabilities and talents, and to cater for the diversity of learner goals in the form of self-paced and self-directed learning. To enable personal development at all ages by widening access to post-school education and other training.
4. To support lifelong learning and promote good citizenship by welfare and/or market oriented policies in a balanced view of appropriateness and cost-effectiveness.

Fifteen quality indicators of lifelong learning and education are given by (EC, 2002) and listed in Table 2. The following sections explain the strategies of organizing lifelong learning and lifelong education for geomatics professionals, and proper policy adopted by governments in offering such learning opportunities to learners in Hong Kong.

Organizing Lifelong Learning

As shown in Table 1, lifelong learning activities are being organized formally, non-formally and informally in educational institutions, learning organizations, learning networks, learning communities and learning cities. Educational institutions focus on liberal/general curriculum, common core curriculum, and professional/vocational curriculum under the three dimensions, namely vertical integration (whole-life settings), horizontal integration (formal, non-formal and informal settings) and the settings of 'learning to learn'. Example of common core curriculum for geomatics is shown in Table 3. The types of effective education system are distance learning, linking education and work, innovative approaches to learning and teaching, and learning from peers (Knapper and Cropley, 2000).

In order to organise learning effectively, learning organizations (LOs) must be developed in institutions, enterprises and professional institutions in which knowledge database and management systems are established allowing its users to contribute and share the database, to manage their learning projects, and benefit from the learning. Examples of LOs are quality circles of a factory, research teams of a university faculty, and working groups of a professional association.

Rapid advancement of information and communications technology (ICT) such as the Internet has established global learning networks linking LOs and expanding them into communities of learning and practices. These open learning networks foster a wide range of skills and abilities on a self-directed basis to satisfy individual learning needs. One of the best known lifelong learning model is given by (Lave and Wenger, 1991; Wenger, 2002) on social or situated learning in which novice and more experienced learners are inducted into communities of practices under the situations of inter-subjectivity and legitimate peripheral participation. Inter-subjectivity refers to the common-sense and shared meanings, subject-to-subject knowledge or situatedness of knowledge that are constructed by learners in their social interactions with each other and used as an everyday resource to interpret the meaning of elements of social and cultural life (Rogoff, 2005; Seale, 2003). Legitimate peripheral participation refers to social interaction of learners or participants who learn from experts and professional practitioners in everyday activities and acquires the knowledge and skills within a community of practice. The 'community' means classroom community, community of learners or a professional organization. As the new participants move from the periphery of the community to its centre through cognitive apprenticeship, they become more active and engaged within the culture and eventually assume the role of expert practitioners (Lave and Wenger, 1991).

Professional institutions for example, the Canadian Institute of Geomatics and the Association of Canada Lands Surveyors, play a major role in offering such informal training to practitioners in the form of Continuing Professional Development (CPD) program or professional certification. What are the most popular courses or training demanded by geomatics professionals in Hong Kong? The survey result of (Shen et al., 2002) indicates that the most popular courses among adult learners from highest to lowest demand are computer, business management, language (including translation), social work, urban studies, education, accounting, secretarial skills, engineering and occupational safety. By inferring the above result from the large population of adults to the small population of geomatics professionals, the author asserts that, in the future, more emphases should be put on Geo-IT, GIS Applications and Geomatics Business Management in developing sustainable geomatics curriculum and organizing CPD functions. More Web-based standalone courses should be

developed so that geomatics professionals can enjoy learning at any time, anywhere and low cost.

The goal of organizing these various forms of learning models and learning communities is to create learning society or city for the political, economic, social, financial, environmental, cultural, educational, technological well-beings (Longworth, 2006) and for fulfilling all-round development of individual learners.

Making Policy Work

Important policy goals of lifelong learning and education are to increase and widen participation in education and training for those who are unemployed, underemployed, minority ethnic groups, adults with learning difficulties and older people. Two common educational policy models are being adopted by global governments, namely the welfare model and the market-oriented model (Griffin, 2002). In the former, it is the government which identifies and provides for learning needs. In the latter, providers of both public and private sectors respond to learner demands through a market mechanism, which is the shift from social control to lifelong learning (Figure 1).

In views of appropriateness and cost-effectiveness, the balanced welfare and market-oriented policy model should be adopted by global governments. For example, under the welfare objectives of the model, Hong Kong Government has established the Continuing Education Fund (CEF) subsidizing learners in the form of tax rebate/deduction since 1996. The Government also collaborates with self-financed institutions and industries in sponsoring Engineering Surveying Technology and Equipment Exhibition and CPD Functions.

Under the market-oriented objectives of the policy model and the pressure from economic interests of the public, education systems are being deregulated to a certain extent for widening access to higher education. For example, geomatics and other university programmes from Australia, UK and USA are now being offered in the form of distance education and Web-based learning in Hong Kong. Thus local institutions must foster continuous improvement to meet international quality standards and avoid being phasing out from the educational market.

Consequences for increasing access and mass education become serious with the emergence of more self-financed study programmes and educational privatization and the change of educational policies from social control to lifelong learning (Figure 1). A trend that only middle class or higher income families could afford the education and training thus increasing social exclusion by the education system, and that low-income people would not benefit from lifelong education and will be further disadvantaged as the knowledge gap grows (Shen et al., 2002).

Conclusions and Future Developments

Human beings are born to be lifelong learners by having the basic need to learn how to survive, be employed and enjoy life in various forms of learning and education as shown in Table 1. The paper asserts that goals of lifelong learning are to increase economic productivity and competitiveness, develop social inclusion and cohesion, enable personal development at all ages by widening access to post-school education and other training, promote lifelong learning and good citizenship under the balanced welfare and market-oriented model of educational policy (Table 2); and that governments should collaborate with professional institutions in organizing continuing education courses, CPD programmes and

certification for geomatics professionals. More emphases should be put on Geo-IT, GIS Applications and Geomatics Business Management in developing sustainable geomatics curriculum (Table 3) and organizing CPD functions; and on Web-based standalone courses so that geomatics professionals could learn valuable knowledge at any time, anywhere and low cost.

Table 1: Forms of lifelong learning (Colardyn, 2002, Table 0.1; modified)

Dimensions	Personal development	General initial education	Vocational education/ training	Professional development
Funding	- Non-profit based, learners' and public funding	- Public	- Public and private	- Private
Objectives	- Promotion of democracy - Equality - Respect of plurality of values	- Basic and foundation education	- Vocational education and training - Transition to work	- Work specific training - Management - Corporate universities - Recognition of competencies - Human resource management
Focus of learning	- Democracy - Literacy (adults) - Enlightenment, concepts (young and adults)	- Basic skills (read, write and count) for young - Little for adults (prior learning assessment)	- Young adults - Training and retraining for unemployed - Retraining of under qualified employed	- Integration in enterprise - Retraining of adults
Certification	- Often non-existent	- Formal general qualifications - Credit towards a formal qualification	- Formal vocational qualification	- Attendance certificate - Certificate of competencies
	Non-formal (including informal)	Formal	Formal	Non-formal (including informal)

Table 2: Fifteen quality indicators of lifelong learning (EC, 2002; modified)

Area A: Skills, competencies and attitudes
1. Literacy, both reading and writing skills.
2. Numeracy skills, the mathematical literacy to deal with numerical information.
3. New skills for the learning society, which include up-to-date (a) numeracy and literacy skills, (b) basic competencies in mathematics, science and technology, (c) learning-to-learn skills, (d) foreign languages, (e) ICT skills and use of technology, (f) social skills, (g) entrepreneurship, and (h) general culture.
4. Learning-to-learn skills, including the ability to learn and to adaptive, and the curiosity and interest in new developments and skills.
5. Active citizenship, cultural and social skills in order to understand the living environment and the needs of society.
Area B: Access and participation
6. Increase access to lifelong learning by offering more flexible, integrated and effective programmes while developing new learning processes, products and environments.
7. Widen participation in lifelong learning for all ages focusing those aged 25 to 64.
Area C: Resources for lifelong learning
8. Funding: increase investment in lifelong learning, calling for a substantial increase in per capita in investment from the public and private sectors.
9. Teacher education: education and training for teachers, trainers and other learning facilitators.
10. Facilities: offer PC, access to Internet, ICT in learning, distant education and e-learning in educational institutions and public libraries.
Area D: Strategies and system development
11. Strategies of lifelong learning in system development, partnership working (private and public, social and cultural) and cross-cutting aspects (education/training mobility).
12. Coherence of supply in relation to demand of formal, non-formal and informal education and training, together with local or international plans, and strategic goals.
13. Counselling and guidance are being developed to: (a) access learning opportunities, (b) motivate people to learn, (c) develop individual learning paths, and (d) make successful transitions between the education, training and employment systems.
14. Accreditation and certification by government manpower authority and professional institutions.
15. Quality assurance, that relates to values and standards of lifelong learning at both local and international levels.

Table 3: Common core curriculum for undergraduate program in geomatics (Lam and Chan, 2007)

Major Courses	No. of Modules
Geodesy and Global Navigation Satellite Systems (GNSS)	2
Photogrammetry	2
Remote Sensing and Image Analysis	2
Engineering Surveying	2
Cadastre, Land Management and Land Registration Information Systems (LRIS)	2
Spatial Information Management and Geo-Information Technology (Geo-IT)	1
Applications of Geographic Information Systems (GIS)	1
Cartography and Map Production	1
Hydrographic Surveying and Hydrographic Information Systems (HIS)	1
Statistical and Adjustment Analyses for Geomatics	1
Geomatics Business Management	1
Geomatics Research Methodology and Dissertation	1
Survey Camps/Projects (Control Network, GIS Mapping, Photogrammetry, Hydrography, Boundary, and Metrology/Construction)	2
Sub-total:	19
Minor Courses	
Advanced Engineering Mathematics	2
Computer Programming and Data Structures for Engineers	2
Information Systems and Internet Technology	1
Construction Technology and Management	1
Environmental Engineering Systems	1
Property Appraisal, Development and Finance	1
Urban Economics	1
Real Estate and Facilities Management	1
Second Language	1
Humanities and introductory knowledge of other professions/disciplines	2
Sub-total:	13
Total Modules	32

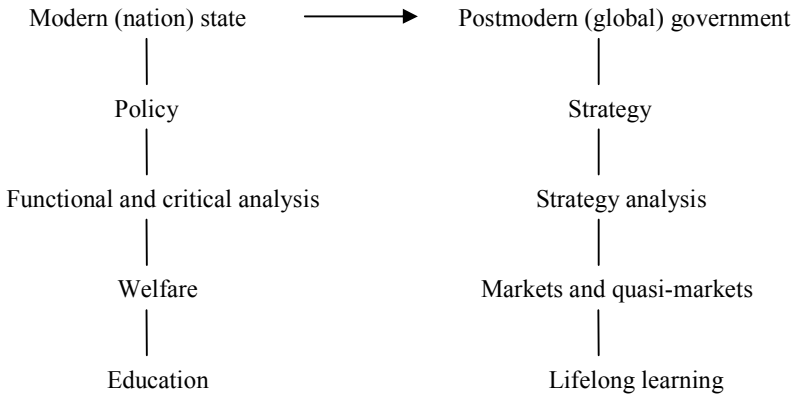

Figure 1: Change of educational policies from social control to lifelong learning (Griffin, 2002, Fig. 7.3)

References

Colardyn, D. (2002), From formal education and training to lifelong learning, in Colardyn, D. (Ed.), *Lifelong Learning: which ways forward?* 2nd ed., pp. 17-28, Utrecht: Lemma.

Griffins, C. (2002), Lifelong Learning and Welfare Reform, in Edwards, R., Miller, N., Small, N. and Tait, A. (Editors, 2002), *Supporting Lifelong Learning Vol. 3: Making Policy Work,* Chapter 7, London: RoutledgeFalmer and The Open University.

EC (2002), *European Quality Indicators for Lifelong Learning*, Brussels: European Commission.

Jarvis, P. (2004), *Adult Education and Lifelong Learning: Theory and Practice*, 3rd ed., London and New York: RoutledgeFalmer.

Knapper, C. and Cropley, A. (2000), *Lifelong Learning in Higher Education,* 3rd ed., London and Sterling: Kogan Page.

Lam, S. and Chan, A. (2007), Sustainable Curriculum for Geomatics Higher Education, *Proceedings,* Symposium: Knowledge is Power, FIG Commission 2 and Czech Technical University, Prague, 7-9 June, 2007.

Lave, J. and Wenger, E. (1991), *Situated Learning: Legitimate Peripheral Participation,* Cambridge and New York: Cambridge University Press.

Longworth, N. (2006), *Learning Cities, Learning Regions, Learning Communities: Lifelong Learning and Local Government,* London and New York: Routledge.

Rogoff, B. (2005), Cogntive Development Through Social Interaction: Vygotsky and Piaget, in Murphy, P. (ed.), *Learners, Learning and Assessment*, Chapter 5, pp. 69-82, London: Paul Chapman Publishing Ltd.

Seale, C. (editor 2003), Researching Society and Culture, 2nd ed., London: Sage Publications.

Shen, S. M., Lee, W. C. and Chan, F. T. (2002), A Profile of Hong Kong Adult Learners: a Survey of Demand for Continuing Education in Hong Kong, in Cribbin, J. and Kennedy, P. (Editors., 2002), *Lifelong Learning in Action: Hong Kong Practitioners' Perspectives,* Hong Kong: Hong Kong University Press.

Wenger, E. (2002), Communities of Practice and Social Learning Systems, in Reeve, F., Cartwright, M. and Edwards, R. (Editors, 2002), *Supporting Lifelong Learning Vol. 2: Organizing Learning,* Chapter 10, London: RoutledgeFalmer and The Open University.

About the Author

Steve Lam, CLS, BTech(Ryerson), BA(York), MSc(Greenwich), MPhil(PolyU), has been working as Lecturer since 1997 in the Department of Land Surveying and Geo-Informatics of the Hong Kong Polytechnic University. Before joining the Department, he was site engineer and chief surveyor in land surveying and construction projects.

Contacts

Steve Lam
Department of Land Surveying and Geo-Informatics
The Hong Kong Polytechnic University
Hung Hom, Kowloon,
Hong Kong SAR
People's Republic of China
Tel. (852) 2766 5964
Fax (852) 2330 2994
Email: lslams@polyu.edu.hk