The Education and Training of Learning Technologists: A Competences Approach

(Red to IEEE Technical Committee on Learning Technologies)

Roger Hartley¹, Kinshuk², Rob Koper³, Toshio Okamoto⁴ and J. Michael Spector⁵

¹University of Leeds, UK // JRogerHartley@ntlworld.com
²Athabasca University, Canada // Kinshuk@ieee.org
³Open University of the Netherlands, The Netherlands // Rob.Koper@ou.nl
⁴University of Electro-Communications, Japan // okamoto@ai.is.uec.ac.jp
⁵University of Georgia, USA // mspector@uga.edu

Introduction: Issues and Requirements

During the last thirty years, developments in the new technologies have caused radical changes in the direction and conduct of industry and commerce, in service industries and education, and in society at large. High performance computing, PCs and notepads, and mobile technologies have enabled institutions and individuals to function more effectively in the workplace and socially. Broadband networking, multimedia and an increasing range of software tools have made communication and the exchange of information at a distance both speedy and engaging. In brief, such innovations have not only led to the growth of new industries and increasing prosperity in society but to a greater openness in their interactions and management. Given these changing contexts and the challenges and opportunities they present to education and training, it is desirable, even necessary, to re-examine the instructional process, and to see learning as a continuing progression with students acquiring competence to employ technology in their classroom learning, and in the workplace, and with a capability of contributing, in due course, to the continuing development and applications of technology.

The educational and training requirements of Advanced Learning Technology (ALT) need to engage with curricula that reflect the varied requirements of the workplace and of society. Students have a range of interests and ambitions in ALT which the instructional process has to accommodate and support, as well as in enabling them to achieve greater autonomy in managing their learning through the new technologies: teachers and trainers have to adapt their curricula and pedagogies to achieve these expanding objectives. Also, employers are becoming increasingly concerned that the instructional process makes adequate linkages to the requirements of the workplace, not only by developing knowledge and process skills but in ways that encourage innovation and collaborative working. And such criteria are of interest to professional organisations as they decide their accreditation and Chartership standards. With these considerations in mind the IEEE Technical Committee on Learning Technology established a Working Committee to develop specifications for new curricula for advanced learning technologies. [The Working Committee includes Roger Hartley (Chair, University of Leeds, UK); Kinshuk (Athabasca University, Canada); Rob Koper (Open University of the Netherlands); Toshio Okamoto (University of Electro-Communications, Japan); and Mike Spector (University of Georgia, USA.)] In its response the Working Committee has adopted and developed a competency based perspective with regard to curricula and assessments to cover undergraduate, postgraduate and training levels. The competences have been elaborated and assembled as a framework of competence domains, classes and tasks which—in association with the curricula themes and topics specified by the Working Committee, should be useful to educators and practitioners in adopting a broader multi-disciplinary approach, and in developing greater skill and understanding when applying technology to improve education and training. In brief the Working Committee was intent on determining and meeting the requirements of professionals working in ALT: what they are expected to know and to do, not only now but throughout the next five to ten years.

The Competences Perspective

Interest in adopting competence perspectives as an aid to understanding and managing human resources within organisations came to the fore in the 1980s, and during the last decade this approach has also become increasingly important in the management and assessment of courses in education and training. Competence places the focus on behaviours that demonstrate effective performance in context, but the term is not narrowly interpreted as a performance that draws only on knowledge and skills, but on attitudes and personal attributes such as innovation and
collaborative working. Competence improves with experience, so levels of competence can be recognized and assessed: most contexts require an interplay of differing competences, which provides the impetus for specifying competence frameworks. (Voorhis, 2002; Sampson & Fytros, 2008.)

Potentially there are several advantages in adopting a competences perspective in education and training. It links student activities to what is required and valued by the institution, and to the supports, e.g. the pedagogies that are to assist the learner in achieving these objectives. Performances under a competence framework give feedback to students and to teachers on the progression towards the course aims, allowing for reflection and possible amendment to the educational and training schemes. It can also aid motivation with the coherence of the framework shared between students giving a greater sense of a “community of practice”. Further, having a competence framework across a department/institution enables easier transfer between courses that can take account of students’ developing interests. However, realising these benefits is not automatic; it requires careful planning and specification of a competence/curriculum framework and close supervision of its management (Dennen & Spector, 2007; Lystras, 2008).

In this respect it is important that the framework, and what it is expected to achieve, is explained and justified to both students and teachers. The framework has to be clearly expressed: if it is too detailed its focus can become diffuse, if it is too spare then its direction can appear vague. Also, the framework in its structuring should be flexible enough to adapt to the varying needs of courses in ALT: indeed its application will require a continual refashioning particularly when taking account of the continuing developments in the new technologies.

Following these perspectives the Working Committee received input from a variety of authorised sources and undertook detailed discussions with associates concentrating, in the first instance, on the requirements of ALT curricula for education at undergraduate, postgraduate and training levels. Drawing on topics conceived as clusters of competences a draft framework of 13 curriculum themes and their components was set out and presented to participants at two instances of the International Conferences of Advanced Learning Technology (ICALT) in workshop and panel sessions. Following these discussions and further clarification and amendment, the curriculum scheme was sent to a selection of thirty participants for detailed comments, not only on its content but on its practicality in meeting the diverse requirements of ALT education and training. The amended version of the curriculum topics and a synopsis of participants’ comments are shown in the next section of this report.

A similar cycle of activities and discussions was followed in specifying an associated competences framework, and details of these methods and the resulting scheme are presented in a later section of this report.

**Curriculum Themes for Advanced Learning Technologies**

It is widely recognized that developments in technology are placing growing demands on the educational system, necessitating changes to curricula, pedagogies and assessment procedures. To put it simply, existing curricula in informatics, learning technology and instructional design are experiencing difficulties in meeting the requirements of those who will be responsible for applying technology in the workplace (Melton, 1997).

In seeking to develop specifications for curricula in Advanced Learning Technology (ALT) which will meet these requirements, the Working Committee has welcomed input from a number of sources including, the International Board of Standards for Training, Performance and Instruction (ibstpi - http://www.ibstpi.org/), the TENCompetence Project (http://www.tencompetence.org/), and many experienced scholars and practitioners in various ALT disciplines (e.g. computer science, educational research, information technology, instructional design, learning science, and performance technology). This activity resulted in 13 topic areas or sections, namely:

1. Introduction to Advanced Learning Technology (ALT);
2. Introduction to Human Learning in Relation to New Technologies;
3. Foundations, Developments and Evolution;
4. Typologies and Key Approaches;
5. User Perspectives;
6. Learner Perspectives;
7. Systems Perspectives;
8. Social Perspectives;
9. Design Requirements;
10. Design Processes and the Development Lifecycle;
11. Instructional Design;
12. Evaluation Models and Practices; and
13. Emerging Issues

These topic areas were identified and clarified after discussions with various experts and practitioners, and the Working Committee’s perspective was that identifying curricula topics is equivalent to clustering competences into a closely related set of knowledge, skills and attitudes which enable a person to perform a task or fulfill a job function with consistency and proficiency. This is essentially the ibstpi definition (see http://www.ibstpi.org), and attainment of a competency is demonstrated by a small number of related performance indicators. Continuing discussions have guided and substantiated this orientation.

It should be noted, however, that the topic areas do not necessarily equate with courses; rather they provide a resource from which ALT courses can be assembled and tailored to meet the particular requirements of students and their educational and training institutions.

The Curriculum/Competence Topic Areas

1. Introduction to Advanced Learning Technology
   This section includes central issues of ALT with an historic overview of ALT perspectives, definitions of key terms and some examples of developments that will be opened up in subsequent sections. ALT perspectives include:
   - The developing roles of technology in the learning process, in the provision and access of multimodal resources, and in enhancing the roles of teachers and mentors often at a distance;
   - The roles of technology and systems analysis in learning design and management that suit a variety of educational and training contexts; and
   - Changing contexts of learning, e.g. just in-time learning, learning-on-demand, and developments in lifelong learning.

2. Introduction to Human Learning in Relation to the New Technologies
   The themes, issues and sub-competencies in this section include:
   - Understanding and explaining human learning;
   - Behaviourist and reinforcement views of human learning;
   - Cognitive interpretations of learning;
   - Socio-constructivist and emotive aspects of learning;
   - Collaborative and cooperative learning;
   - Distributed and distance learning;
   - Instructional design perspectives, and
   - Systems and Information processing approaches to learning.

3. Foundations, Evolution and Developments in ALT
   In this section the overall aim is to identify and describe the types of systems and associated perspectives that have evolved to suit particular pedagogical and performance support requirements. Examples include:
   - Practice and Feedback perspectives: The original emphasis in adaptive, tutorial, and time-shared systems;
   - Representational perspectives: The emergence of graphical and multimodal display technologies; hypermedia, modelling, and simulation;
   - Collaborative perspectives: The development of networking technology leading to collaborative interchanges and learning techniques;
   - Inquiry based perspectives: The influence of developments in information management leading to hypermedia and the WorldWideWeb, and the framework of Virtual Learning Environments;
   - Informal and autonomous learning perspectives: The influence of miniaturisation and mobile technologies on autonomous and informal modes of learning; and
   - Framing perspectives: Frameworks linking ALT pedagogies to types of learning objectives.
4. **Typologies and Key Approaches to ALT**
This section involves a technology-based classification of types of ALT and their system components, characteristics and functions. Sub-topics and technologies involved include:
- The influence of systems perspectives;
- Multimodal presentations and Media based delivery technologies;
- Adaptive technologies, e.g. hypermedia and the selection and linking of learning resources (e.g. WWW);
- Simulations, virtual reality and educational games;
- Computer mediated communication, including discourse systems and dialogue games;
- Constructive supports for learning, e.g. concept mapping tools and technologies;
- Authoring and Supporting Tools for planning, implementation, evaluation, and management;
- Virtual learning environments, systems and frameworks;
- Blended and hybrid learning solutions; and
- Ontologies, learning objects and personalization techniques.

5. **Users’ Perspectives of ALT**
This topic area concerns the central role of learners, teachers, developers and other users in ALT, including the facilities they require in relation to pedagogical features and methods with some illustrations of applications linking to preceding and subsequent sections. Subtopics and associated competency areas include:
- Learning systems (e.g. presentation, tutorial, hypermedia and simulation systems);
- Multi-user systems and collaborative learning;
- User support systems and the management of learning;
- Assessment systems;
- User-centred design and development;
- Web services; and
- Usability and an introduction to usability testing.

6. **Learners’ Perspectives of ALT**
This section focuses more directly on the learners’ views of types of ALT that are relevant to specific contexts and practical applications. Associated subtopics and competency areas include:
- Resource based learning with emphasis on knowledge acquisition and self-regulated learning;
- Tutoring and mentoring systems with emphasis on knowledge development;
- Project- and problem-based learning with emphasis on knowledge construction and model building;
- Collaborative learning with emphasis on knowledge interchange and the dynamics of interactions between and among learners, tutors and the system;
- Learning communities and communities of practice; and
- Specific applications to suit a variety of contexts, such as:
  - Science/Mathematics learning including tutorials and support tools;
  - Engineering, including simulations;
  - Computer Studies, including programming;
  - Medicine/Biology, including multiple applications;
  - Language learning, including audio feedback and immersive approaches;
  - Business Studies, including case-based approaches; and
  - Built-in and embedded environments, including electronic performance support systems.

7. **Systems’ Perspectives of ALT**
This section is concerned with technical aspects of essential system components and how these interlink to form types of advanced learning systems. Specific areas and concerns include:
- Knowledge bases and their representations of types of subject matter;
- User Interface and HCI affordances;
- Student models, profiles and student modelling;
- Pedagogic and Administrative frameworks;
- Distributed learning environments; and
Architectures for educational technology systems, such as:
  - Client-server systems and VLE/Management frameworks; and
  - Reusable component-based systems.

8. Social Perspectives of ALT
   This section recognizes that technology is typically used by multiple groups and typically forms a part of a
group’s identity. Specific concerns in this section include:
   - Characteristics of groups and their contextualising within learning environments;
   - Organizational and group management issues;
   - Building e-communities and social networks; and
   - The role of technology in a group’s language and culture.

9. Design Requirements
   This section involves particular issues and requirements that are critically relevant to design processes. Specific
   concerns in this section include:
   - Designing for varying contexts and individual differences;
   - Pedagogic frameworks, including frameworks for the tutor, the student, the system, and coordination among
     these;
   - Student models, profiles and adaptivity;
   - User-system interactions and Interface designs; and
   - Links to on-line resources and work portfolios.

10. Design Process and Development Lifecycles
    This section focuses on design and development issues, including:
    - Needs assessment and acquisition (identification, definition, confirmation);
    - Analysis, including identifying task objectives and competencies;
    - Instructional design and development of components;
    - Interface designs and interactions;
    - Tools for authoring (design and development tools);
    - Implementation tools and methods (including field tests and validation); and
    - Support methods and mechanisms for maintenance and periodic review.

11. Instructional Design: the Learning Objects Approach
    This section recognizes the key role that technologies such as learning objects play in instructional design.
    Specific concerns include:
    - Outline of learning object requirements;
    - Object creation;
    - Metadata creation;
    - Sequencing and interlinking schemes for learning objects to inform a course unit;
    - Packaging content;
    - Other forms of reusability; and
    - Reusability and the personalization of learning.

    This section focuses on assessment and evaluation models, methods, tools and technologies. Specific concerns
    include:
    - System component evaluation (formative, summative and confirmative);
    - Assessing and analyzing impact of use;
    - Program evaluation (of the larger context in which an ALT resides);
    - User evaluation and assessment (by students and teachers) of specific learning and performance outcomes;
    - Longer term (longitudinal) contextual evaluation including organizational impact, and societal influence;
    - Evaluation instruments and techniques, including ethnographic, empirical and analytic tools and
      technologies; and
Models of evaluation (e.g. case studies, grounded theory, comparative, illuminative and experimental approaches).

13. Emerging Issues in ALT
This section recognizes the dynamic nature of technology in learning, instruction and performance. Specific areas of current interests include:
- Ethical, security and privacy issues including intellectual property rights;
- Scalability, sharable resources and standards (e.g. the semantic Web);
- Quality control and accreditation;
- Mobile technologies, personalized and informal learning; and
- Technological impacts on society (e.g. Inclusion, social and gender issues); and
- Models for the searching and management of sources and resources.

The content and organization of the topic areas were discussed in Panel Sessions at two instances of the International Conferences on Advanced Learning Technology (ICALT). In addition, the scheme was sent to over thirty participants for their detailed comments which were also taken into account when drafting the Curricula/Competence document. These comments confirmed that the targeted areas were clear in their content and structure, and broad enough in their scope to accommodate different navigational tracks to suit particular requirements of teachers. This was more directly confirmed by sending the scheme to selected teachers (in undergraduate and postgraduate education and training), and asking them to indicate and to comment on the navigation tracks forming their curricula.

The Competence Framework for Advanced Learning Technologies

As noted previously, the IEEE Technical Committee on Learning Technology established a Working Committee to develop specifications for new curricula for advanced learning technologies (ALTs). What prompted the establishment of the Working Committee—and in turn drives this Committee’s task—is the rapidly changing nature of technology with many implications for how learning is best supported in a wide variety of contexts. In this respect the Working Committee welcomed input from a number of sources, including the International Board of Standards for Training, Performance and Instruction (ibstpi - http://www.ibstpi.org/), the TENCompetence Project (http://www.tencompetence.org/), and many scholars and practitioners in a number of ALT disciplines. The Working Committee’s perspective is that a competence is a set of related knowledge, skills and attitudes which enable a person to perform a task or fulfill a job function with consistency and proficiency (this is essentially the ibstpi definition; see http://www.ibstpi.org). Attainment of a competency is demonstrated through a small number of related performance indicators covering related sets of knowledge, skills and attitudes (Spector & de la Teja, 2001; Paquette, 2007; Sampson & Fytros, 2008).

With the assistance of ICALT participants, the Working Committee has been engaged in clustering competences around a small number of domains (such as knowledge, process, application, personal and social issues, and innovative and creative aspects) and their associated classes of tasks that would be useful to those who are responsible for developing curricula and pedagogies, as well as having in mind the workplace contexts and streams engaged with Advanced Learning Technology. An elaboration and specification of these competence domains is presented below.

1. Knowledge Competence Domain

This domain includes competences concerned with demonstrating comprehension and understanding of learning theories influencing ALT: the various perspectives and types of ALT; the pedagogies linking ALT to educational contexts; relevant experimental studies and applications; and the general and emerging issues which ALT presents to education and to society.

To demonstrate competence, such knowledge should be presented in ways which relate to practical contexts, and the types of situations these entail, such as giving guidance and advice in response to needs, explaining and justifying decisions, outlining alternatives and their implications, identifying issues, and pointing to relevant sources.
These *classes* of competence might include:

- Explaining the types of ALT suitable for a given context, and a justification in terms of the links to learning theories, and to pedagogies directed at that context. This is a broad assignment and could be broken down into components, either in the class definitions, or in related tasks set in a context to which this competence class relates; for example:
  - Explaining the ways learning theories, and associated research designs, have influenced types of ALTs, and how these have resulted in, or interlinked with, the educational features of ALTs;
  - Describing/discussing/assessing/explaining how types of ALTs lead to pedagogies that support their effectiveness in the educational context;
  - Identifying the major achievements of ALTs to education/training, and the potential hurdles which can inhibit their effectiveness; and
  - Summarizing the emerging issues which ALTs present to educational systems.

Within such classes, or their derivatives, specific tasks (set in context) with their behavioural markers will seek to assess this competence (class). An assumption is that knowledge competence requires the *use* of knowledge to be demonstrated in achieving a representative task objective: the knowledge itself is a necessary but not a sufficient condition for achieving a competence. Since the tasks used to judge competence will be set and constrained by their context, the task/context should be chosen to be representative (of the class of tasks) and hence be a (more) valid estimator of that competence.

2. **Process Competence Domain**

These competency classes focus on the operational skills in employing software tools to achieve required ALT objectives. These tasks, set in contexts, are to assess process competence by examining how well the software has been utilized in producing an outcome which is effective in achieving the task objectives. These competences can also be mapped back to many of the subtopics described in the 13 topic areas.

There is a range of software tools which could have a place in the curriculum, including: *(a)* virtual learning environments such as BlackBoard, Moodle and Sakai; *(b)* presentation and authoring tools such as PowerPoint and Adobe CS; *(c)* concept mapping tools and related systems; and *(d)* multimedia software, and other packages related to simulation and gaming.

The competence *classes* could include:

- Operating the packages to achieve task objectives, noting methods to suit the contextual requirements;
- Demonstrating troubleshooting capabilities and explaining the procedures;
- Showing understanding of the structure/architecture of the software and an awareness of its strong features and limitations;
- Ability to give advice on which packages are appropriate for the objectives of the given task; and
- Ability to devise training scheme outlines for the packages.

Students may be asked to provide a portfolio of work on using the packages as part of the curriculum, which could incorporate these competence class tasks. This might be managed in collaborative or project working (which could include genuine workplace settings) with students giving presentations on their work.

3. **Application Competence Domain**

This competence category concerns the application of ALT in pseudo-practical contexts that can involve an analysis of educational requirements, conceptual designs of an instructional system, aspects of its implementation, and commentaries on methods of evaluation. The contexts for exercising and assessing these competencies can be many and various. Tutors will sample them in ways which meet their particular requirements while preserving the competence focus, and there are ways in which larger tasks can be broken into smaller units standing independently or placed in a related sequence.
The competence classes might include:
- Identifying educational requirements/needs of the given context;
- Given an educational need (relevant to the context) identifying instructional components, and their functions, in a conceptual system design which meets those needs, and justifying the decisions;
- Elaborating the design features and specification of a component of the instructional system (which could be given a practical implementation);
- Outlining and justifying a formative evaluation study of the instructional system, or its components. (Some of these measures could be implemented and perhaps field tested.); and
- Explaining how the instructional system could be effectively incorporated in the educational practices of the institution, noted in the context.

4. Personal and Social Competence Domain

During their courses, students are encouraged to become more effective autonomous learners by setting goals and workplans, improving study skills, and monitoring/reflecting on their learning and progress. However, the varied experience of ALT students, and the range of facilities available in the curriculum and institution, also encourages interaction and collaboration (both formally and informally) between students and student groups.

These communicative, interactive, management, and social skills, are important for learning during the ALT courses, and certainly attract the interest of future employers. But they are not easy to assess.

These personal and social competence classes may include:
- Competence to assist in the formulation and acceptance of group objectives;
- Competence to engage and share ideas related to the agreed collaborative objectives and their development;
- Competence to take on required roles in the group enterprise;
- Competence to be aware of the group dynamics, to build cooperatively, to assume leadership, and to resolve conflicts; and
- Competence to become aware of the strengths and weaknesses of the group (its signification) and so react in tactical ways to further the group’s objectives.

5. Innovative and Creative Competence

During their courses students should come to understand how ALT can address educational needs in ways which realize the innovative potential of the new technologies (i.e. that ALT is not merely a support of conventional practices, but can become a change agent which brings different perspectives to the education process, and indeed presents the educational system with challenging issues). It would be useful to examine if students have gained some of these innovative and creative competencies.

The competence classes could include:
- Competence to perceive the range of educational opportunities for ALT presented by the context, i.e. to be aware of the bigger picture and to think flexibly and with innovation in considering the range of options;
- Competence to engage in reasoned speculation, considering what-if questions in relation to the context objectives and methods of approach;
- Competence to evaluate a range of proposed options giving justifications for the decisions; and
- Competence to perceive the implications of proposed ALT solutions or schemes, which could be followed up in further work, i.e. to be aware of issues such as sustainability, development and problems of scale.

Although the linkages between the curriculum topics and the clustering of competence classes has been noted, the pedagogies adopted by teachers make the secure bridging to student performance. From the experience of practitioners using the curriculum/competence framework, it is desirable to gather examples of tasks and contexts into a database that can provide illustration and guidance of the types of activities and resources employed within the various educational and training levels. This should be useful because it is recognized that the scope and granularity
of the competence domains and associated classes is an open issue in many cases, and the creation of meaningful and authentic tasks presents a challenge to teachers.

The competences framework was discussed in panel sessions during the International Conferences on Advanced Learning Technology (ICALT), and subsequently was distributed to a selection of participants for their considered comments. Their responses were supportive of the competences approach and the classification system. The level and detail of the framework was judged to be satisfactory for course accreditation purposes (the main focus of this report) and would provide useful guidelines for teachers and ALT practitioners: for types of professional accreditation, e.g. in the organizational or administrative industries, more specialized specifications are likely to be needed. It was noted that institutions could elaborate the curricula topics and competences in ways which would suit their overall ALT objectives and the requirements of their students but practitioners and teachers would need to be responsive to "emerging technologies and their changing literacies". Although presenting some difficulties in assessment, the comments emphasized the importance of the Innovative and Creative competences, and the Personal and Social Competence Domain. It was also pointed out that the various competences interplay as they participate in complex task interactions which become synthesized into student capabilities within the learning and workplace contexts.

Competences are demonstrated through performances in context and, in specifying and classifying ALT competences, the workplace (in commerce, the service industries and education) was kept in mind, as were published examples of Learning Technology competences and the commentaries of the European e-Competence Framework for Business. The increasing interest of Professional Associations in ALT—in relation to Chartership requirements and to course monitoring of Institutions—was also noted. These relationships and their relevance to the Competence Domains, Classes and Tasks proposed by the Working Committee are shown in a schematic attached as an Appendix.

The linkages between ALT Educational and Training Institutions, and the workplace are clearly important, and are being made transparent through work-based assignments and placements. These provide authentic contexts for the exercising and development of competences where students have to understand the organizational structures in which they operate, and of the opportunities or agencies which can stimulate and substantiate their competences in the workplace. In these ways students’ capabilities in ALT are enlarged as they become aware of their ‘place’ in the institution. The Working Committee sees the strengthening of these linkages as an important development in ALT education and training, and one which particularly benefits from following an e-competences approach.

Summary

In response to the need for curricula to meet the challenges and opportunities presented by technological developments to education and training, the Working Committee (established by the IEEE Technical Committee on Learning Technology) identified and showed potential benefits of adopting a Curricula/Competence perspective. The aim was to enable educational technologists to obtain a broader multidisciplinary background that took account of what they will need to know and do, not only now but in the next five or ten years.

Themes and topics within the proposed ALT curriculum, and covering undergraduate, postgraduate and training levels, were conceived as equivalent to clustering competences into a content that included knowledge, skills and attitudes. The topics were summarised under thirteen themes covering relevant aspects of learning, key developments in ALT, learners’ users’ systems’ and social perspectives, design requirements and the design process, evaluation models and practices, and emerging issues in ALT. This framework does not specify courses, but themes and topics which can be assembled and elaborated to meet the varying requirements of students, teachers and institutions. In framing this specification the Working Committee was able to take advantage of wide ranging discussion with colleagues and associates, and with participants at the annual ICALT Conferences.

The competence framework itself was structured under competence domains, their constituent classes and examples of tasks through which levels of competence could be assessed. These domains not only included Knowledge, Process and Application skills, but Personal, Collaborative and Social attributes, and Innovative and Creative competences. Important issues were flexibility in meeting the varied requirements of institutions and teachers, the interplay of competences in the developing capability of students, and linkages to the needs of the workplace. Again
the competence framework benefited from comprehensive discussions, including those from Workshop/Panel sessions at the ICALT Conferences.

It is hoped and expected that the Curriculum and Competences Document will prove stimulating and useful to the ALT community as they meet the educational opportunities and challenges presented by the new technologies.

Acknowledgements

The Working Committee welcomed the opportunity offered by the IEEE Technical Committee on Learning Technology to undertake the Curriculum/Competences reflection and specification in response to the developments in Advanced Learning Technology. The Working Committee also gratefully acknowledges the assistance given by the wide-ranging discussions with associates and participants at the ICALT Conferences.

References


Appendix: A Competences Perspective for Learning Technology

**Employment Institutions**
- Teachers/Trainers
  - Subject/Curricula using LT
  - LT Specialist Teachers

**LT Support Systems**
- Procurement, Support, Training, Development: Systems/Software
- Planning/Development Bespoke and Innovative Software

**Software development**

**External Competences**

**Educational and Training Institutions**
- Lectures: External Sources
  - Seminars
  - Workshops
  - Assignments
  - Projects
  - Informal Learning

**Internal Competences**

**Professionals Agencies**
- Chartership Requirements
- Course Monitoring

**Eg: European e-Competence Framework (ICT Business)**
- Competence Areas:
  - PLAN-BUILD-RUN-ENABLE-MANAGE
- Reference e-competencies for each area
- Proficiency levels for each e-competence
- Related knowledge and skills (optional framework)

**Linkage Mechanisms [Employment Institutions]**
- Workplace Linkage (Client assignments)
- Workplace Projects and Work Placements

**Linkage Mechanisms [Educ/Training Institutions]**
- Competence Domains:
  - Knowledge (Cognitive) Competencies
  - Process (Software Use) Competencies
  - Application (Design, Implementation, Evaluation Competencies)
  - Personal Competencies (Management and Collaborative)
  - Creative/Innovative Competencies

- Competence classes within each domain
- Representative tasks within these classes

**Courses Committees**
- Student Evaluations
- External Examiners’ Evaluations

**Operation**