PROCEEDINGS OF THE
OPEN WORKSHOP OF

EMPOWERING LEARNERS
FOR
LIFELONG COMPETENCE DEVELOPMENT:
PEDAGOGICAL, ORGANISATIONAL AND TECHNOLOGICAL ISSUES

HOSTED BY ALTRAN SDB

HOTEL SANTO DOMINGO
MADRID - ESPAÑA
APRIL 10-11, 2008
Title: Empowering Learners for Lifelong Competence Development: pedagogical, organisational and technological issues
Proceedings of the 4th TENCompetence Open Workshop Madrid, Spain, 10th and 11th April 2008
Edited by Henk Sligte and Rob Koper
Amsterdam: SCO-Kohnstamm Instituut, Universiteit van Amsterdam, 2008

Electronic proceedings: http://dspace.ou.nl/
# Table of Contents

**Supporting life-long competence development using the TENCompetence infrastructure: a first experiment**  
4

**Cross-system log file analysis for hypothesis testing**  
10

**Turning university professors into competent learners**  
15

**Monitoring professional changes: analysing practices and creating competence profiles**  
21

**Peoples-uni - developing public health competences: lessons from a pilot course module**  
28

**Social Software for Lifelong Competence Development: scenario and challenges**  
33

**Considering dimensions of life-long learning tools**  
38

**Development and Use of the Hybrid Learning Model. Bringing Learning and Teaching Together**  
42

**Towards a TENCompetence ePortfolio**  
47

**Developing the architecture of a large-scale informal e-learning network**  
55

**TENTube: A video-based connection tool supporting competence development**  
59

**Situating Competence within the Person: Modelling Social engagements in the SPLICE project**  
66

**Dialogic learning and interactive groups: an IMS LD template integrated in runtime systems**  
74

**Assessment 2.0: Modernising assessment using Web 2.0**  
79

**Assessment Delivery Engine for QTiv2 Tests**  
86

**TENCompetence Simplified Assessment Model and Related Tools for Non Traditional Methods of Assessment**  
91

**Evaluation of TENCompetence proof of concept assessment tools**  
97
Supporting life-long competence development using the TENCompetence infrastructure: a first experiment

Judith Schoonenboom, Henk Sligte, Ayman Moghnieh, Davinia Hernández-Leo, Krassen Stefanov, Christian Glahn, Marcus Specht, Ruud Lemmers

Contact: Judith Schoonenboom
University of Amsterdam
SCO-Kohnstamm Institute
P.O. Box 94208
NL-1090 GE Amsterdam
Phone: +31-20-5251520; +31-6-30702876
Fax: +31-20-5251200
Email: j.i.schoonenboom@uva.nl

This paper describes a test of the TENCompetence infrastructure that was developed for supporting lifelong competence development. The infrastructure contains supportive elements, among others the listing of competences and their components, competence development plans attached to competences and the possibility to mark elements as complete. In order to test our hypothesis that the infrastructure leads to better competence development, an experiment was carried out. For six weeks, 44 Bulgarian teachers followed a distance course on a specific teaching methodology. Part of them used this infrastructure, part used an infrastructure which was similar, except for the four supportive elements mentioned. The results showed that in the experimental condition, more people passed the final competence assessment, and people felt more in control of their own learning. No differences between the two groups were found between on the amount and appreciation of collaboration and on further measures of competence development.

Keywords: lifelong learning, competence development, infrastructure, evaluation

Introduction

The emerging knowledge society places new demands on both individual workers, groups, and organisations. Central to these demands is the need to continuously develop and manage the competencies which provide competitive advantages [1].

To achieve lifelong competence development there is a need for better integration of learning and knowledge dissemination facilities offered by the different knowledge support organisations in society, e.g. educational institutes, training departments, HRM support organisations, government, libraries, research institutes and others.

The requirements placed on the models and technologies to support such integrated facilities differ considerably from those traditionally placed on technologies to support particular fragments of a learning lifetime, or to serve the knowledge dissemination and knowledge management needs of a company.

The TENCompetence project is a four-year project in the European Commission's 6th Framework Programme, priority IST/Technology Enhanced Learning. The aim of the project is to design a technical and organizational infrastructure for lifelong competence development. The project develops new innovative pedagogical approaches, assessment models and organisational models, and it creates a technical and organizational infrastructure which integrates existing isolated models and tools for competence development into a common framework [2].

The TENCompetence infrastructure will be validated in a number of different pilots, representing the variety of contexts in which lifelong competence development takes place [3]. The research question underlying all pilots is:

For whom does the TENCompetence infrastructure work in a variety of circumstances?

In June 2007, a first version of the infrastructure was delivered, consisting of the
TENCompetence offers an infrastructure [2,4] which, as far as the learner’s freedom is concerned, occupies a position halfway in between traditional education with its rigid learning paths and on the other hand communities such as Flickr and YouTube [8], which provide access to many resources, but do not provide a learning path. Thus, two comparisons are of interest when trying to investigate whether the TENCompetence infrastructure works better than alternative treatments:
- Does the freedom of choice plus the tools to handle that freedom which the TENCompetence infrastructure provides lead to better outcomes than the rigid structures provided by traditional education?
- To what extent are the tools that the TENCompetence infrastructure provides helpful in managing the freedom once learners can choose their own learning path and resources?

The conditions under investigation can be labeled: (1) freedom without support, (2) freedom with support and (3) no freedom. Condition (2) represents the use of the TENCompetence infrastructure. We predict that condition (2) will lead to better results than either (1) or (3).

More concretely, the hypotheses to be tested are:

**Amount and appreciation of competence development**
- Use of PCM will lead to better competence development
- Use of PCM affects the type of competences that are acquired
- With PCM, people appreciate the learning route better
- With PCM, people appreciate the learning resources more

**Appreciation of control**
- With the PCM, learners will experience more control over their learning

---

### Evaluation of use and appreciation of PCM functionalities

The first part of the research was an evaluation of how people used and appreciated the several functionalities that the PCM offers. The elements and functionalities of the PCM are summarized in Figure 1.

#### The Personal Competence Manager

The elements of the PCM are structured hierarchically: Competences to be acquired are listed in a competence profile. With each competence, one or more competence development plans can be associated, which are made up of actions that contain one or more learning resources. All competence profiles, competence development plans and actions can be supplied with a description.

<table>
<thead>
<tr>
<th>The forum</th>
<th>People / chat</th>
<th>Rating</th>
<th>Choosing elements and routes</th>
<th>Marking elements as attained or completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>The forum is where discussions with other participants take place. Participants can react to messages at any time. Each element of the PCM has its own forum.</td>
<td>Participants can see who is online, and they can start a chat of limited duration with other people who are online at the same time. The PCM chat also enables to send files.</td>
<td>Learners can provide ratings to each competence profile, competence development plan, action or resource, to express their appreciation of that element.</td>
<td>At different levels, the PCM allows the learner to take their own route and/or to make their own selection of elements, best fitting their learning needs.</td>
<td>Marking as completed the different elements gives learners an overview of how their learning has progressed.</td>
</tr>
</tbody>
</table>

---

### Hypothesis testing

TENCompetence server and a client software package, called the ‘Personal Competence Manager’ or PCM for short [4]. This paper presents the results of one of the pilots, a pilot in Bulgaria for teachers who have to update their skills in using ICT in teaching [5,6,7]. In investigating this research question, we performed two tests. Firstly, we tested the reported use and appreciation of participants in working with the PCM. Second, we set up hypotheses on the effect of working with the PCM and tested these hypotheses in an experiment.

---

**Figure 1. Main functionalities of the PCM**
Amount and appreciation of collaboration
- PCM will lead to more and better collaboration
- PCM will lead to better appreciation of functionalities for collaboration

Methodology
Setting
In our study, we compared condition (1), freedom without support, to condition (2), freedom with support. The participants in our study were divided into two groups, one group using the PCM and its functionalities, representing condition (2) and one control group using Moodle, representing condition (1). Both groups have the same time schedule.

The intention was to assign participants randomly to conditions, but this turned out to be impossible. Although this means that alternative explanations for the outcomes cannot be ruled out, participants in the two conditions turned out not to differ systematically with respect their relevant background characteristics, which will be described in the next section.

The ICT Teacher Training pilot was performed in Bulgaria in the autumn of 2007, it lasted for one month and a half with a working load of 100 hours in total, including the assessment.

The objective of the pilot is that participants become acquainted with the I*Teach Methodology [6,9], a specific pedagogical approach with an emphasis on collaborative learning. During the first face-to-face starting workshop, both groups were introduced first with the I*Teach Methodology in large, then with their respective software tool (Moodle for the control group, PCM for the experimental group). After that all teachers in the both groups are invited to form groups (2-3 people in a group), to choose a project (with general objective: applying I*Teach methodology in the process of teaching in their own specialty), to start to work on a project and to have the first feedback.

After this workshop both teachers from both groups were involved in the developing of their project, using the facilities of the respective software for communication and collaboration, and during the final workshop they presented their project to all other teachers.

The main differences for both groups can be summarized as follow:
1. The I*Teach Methodology was presented in different ways: (1) with the PCM group, native PCM characteristics and components were used (competence development program, competence, community, learning plan, learning activity, learning resources; see Figure 2); (2) with the Moodle group, a group of several word documents (see Figure 3) described, explained and provided example of the I*Teach methodology.

2. Similarly, students had to develop and present their final project in different ways: (1) in the PCM group using the native PCM characteristics and components; (2) in the Moodle group, the final project was prepared as separate Word documents, structured according to templates for describing scenarios and tasks, and it was presented to the group using a PowerPoint presentation.

Participant characteristics
A total of 45 participants attended the ICT Training pilot. Of these participants, 44 were included in the analyses. The reason for
excluding one of the participants was that this participant had spent 7 hours on the pilot, whereas the other participants spent between 36 and 60 hours. Therefore the results of this participant would not be comparable to the other participants. 19 of the participants worked in the experimental condition, using the PCM system and 25 participants worked in the control condition, using the Moodle system.

Of the remaining 44 participants, 37 were women and 7 were men. All came from Bulgaria. Most of them were middle-aged people. The youngest participant was 23 years old and the oldest participant was 57 years old. In general the participants were highly educated. A large majority of 38 people had a university masters degree, 5 had a bachelor degree and 1 person had a degree in secondary vocational education.

Most of the participants worked as a teacher (40 people, including 5 IT teachers). Three people were school directors and one person was a university lecturer. Years of experience in their profession ranged from 0 to 31 years. There were no significant differences between the participants in the experimental and the control condition.

Measures
Participants were given a pre-test and post-test questionnaire. Participants in the experimental condition filled in a post-test questionnaire asking them for their use and appreciation of the functionalities of the PCM. Hypotheses testing was based on two measures (if necessary, the relevant construct from the hypotheses is indicated in brackets):
1. Result on final competence assessment (amount of competence development)
2. Answers on questions in the post-test questionnaire on:
   - acquired knowledge and skills (amount of competence development)
   - appreciation of learning resources (appreciation of competence development)
   - appreciation of learning route (appreciation of competence development)
   - appreciation of control
   - number of messages posted to the forum (amount of collaboration)
   - number of times chat used (amount of collaboration)
   - appreciation of collaboration
   - overall rating of chat (appreciation of collaboration)
   - overall rating of forum (appreciation of collaboration)
   - Note that what the participants had learned, similar to all other aspects, was measured by asking participants what they had learned (‘how much have you learned with respect to……’). No comparisons were made between pre-test and post-test knowledge and skills levels.

Results
Results of the use of functionalities
When asked, people indicate that the supportive elements are useful. This applies to forum, chat and rating. Only marking as complete is rated in between useful, and not useful nor useless, but this is probably related to the fact that a large majority either didn’t see the mark as complete option, or didn’t know how to use it.

Despite the fact that almost all participants considered these facilities useful, only half of the participants make use of the forum, chat and ratings, and even less make use of the marking as complete option, probably for the reasons mentioned above. The most important reasons for using these facilities were lack of time. Thus, it seems as if many participants view these facilities as useful, but their use takes time, so you use them only if you have got time.

The question is whether people are right in their estimation that using these facilities takes time. The most often mentioned effect of marking elements as complete is that learning becomes more efficient. Increased efficiency is also mentioned with other facilities offered by the PCM: making one’s own selection, and the hierarchical organization, which makes it easy for people to find their way to the learning resources.

The PCM offers people the possibility to follow their own path through the learning resources. There seems to be a divide between people in their appreciation of this opportunity. On the one hand, there are people who at the beginning already preferred to follow their own path, and there were people who enjoyed following their own path. On the other hand there were people who concluded afterwards that it would have been better to follow the prescribed order instead and there were also people who appreciated the fact that the hierarchical organization of elements provided a natural path to be followed. Interestingly, the proportion of people who prefer to follow their
own path after the pilot has risen compared to the situation before the pilot.

There were some usability issues with the use of the facilities, but they were not predominant. There were almost no people who didn’t know how to use the forum, but there were slightly more who didn’t know how to use the chat. Perhaps this is related to the fact that the chat has no separate tab, but a chat can only be started by clicking on a participant who is online. It might be that the group chat is difficult to use: in the Moodle condition more people made use of the group chat than individual chat, and for the PCM this ratio is reversed. There are clearly usability issues with the marking as complete option: a large majority either didn’t know it was available or didn’t know how to use it. There is one problem with the PCM forums: almost half of the people found it harder to find discussions as separate forums were attached to individual elements. Related to this, there were more people who had a preference for one forum than for separate forums for each element.

Undoubtedly, these results are influenced by characteristics of the participants. The pilot participants were highly educated middle-aged teachers, who in general were more used to using the internet for searching for information that for discussion and data sharing. Although not sent or obliged by their employers, their motivation was job improvement and improvement of their proficiency level, and not defining learning goals for themselves. Outcomes may well be substantially different for different target groups.

**Results of the experiment**

In general, there were no differences between the two conditions. Only two results reached the required significance level of .005. First, in the experimental condition, more participants passed the final competence assessment ($\chi^2 = 8.68, df=1, p = .003$). Second, in the experimental condition, participants felt more in control of their own learning ($F=9.90, df = 1, p = .003$).

**Discussion**

From the experiment it became clear that more people in the PCM condition passed the competence assessment, and people in the PCM condition felt more in control of their own learning. By not rejecting them, our data lend support to our hypotheses that use of the PCM will lead to better competence development, and that use of the PCM will lead to more control over learning. The other hypothesis are not supported, but neither rejected by these data.

**Acknowledgements**

The work on this paper was carried out as part of the TENCompetence project, which is (partly) funded by the European Commission (IST-2004-02787) (http://www.tencompetence.org).

**References**


Cross-system log file analysis for hypothesis testing

Christian Glahn, Marcus Specht, Judith Schoonenboom, Henk Sliigte, Ayman Moghnieh, Davinia Hernández-Leo, Krassen Stefanov, Ruud Lemmers, Rob Koper

Contact: Christian Glahn
Open University of the Netherlands
OTEC
NL-6419 AT Heerlen
Email: christian.glahn@ou.nl

Understanding the effects of different functionality in complex learning environments is one of the key challenges of learning technology research. Particularly for new personal learning environments which combine a variety of services to offer new educational approaches such comparisons become increasingly important for analysing the effects compared to established learning environments. This paper discusses the use of cross-system log file analysis for enabling the comparison between different logging approaches used either by different PLE components of different systems used in evaluation.

In the presented example the results of a cross-system log file analysis are also used for validating the results of other measures as a questionnaire. This kind of validation reduces the gap of self-recognition of activities and opinions of learners, and the actual performed actions within a learning environment.

This provides a more detailed picture than subjective evaluation could do alone.

Keywords: competence development, virtual learning environments, log file analysis, evaluation

Introduction

Understanding the effects of a technology for the learning process is one of the key challenges of learning technology research. Over time, this challenge has changed in its focus remarkably for complex integrated learning environments. Especially in new personal learning environments where a variety of functionality can be combined and used in different ways by the learners an analysis of the effect of the different tools and functionalities on learning becomes more difficult and requires multi-method approaches.

This shift has implications on the technical and empirical design of evaluations of virtual learning environments. This methodological paper describes an approach for comparing interaction footprints (as log files and others) from different systems and independent service components, and how this approach helps improving the quality of overall evaluation results. This approach is called cross-system log file analysis and is used to structure and compare user visits and navigation behaviour of virtual learning environments which services are based on different underlying software components.

Cross-system log file analysis is used within the TENCompetence project for evaluation of pilot studies. The TENCompetence project aims at the development of an European infrastructure for lifelong competence development. The underlying educational principles of learning networks and competence centred learning [2, 3] require structural changes of design and functionality of virtual learning environments in order to meet the variety of ways of competence acquisition and development in lifelong learning support. This implies that an infrastructure that supports competence centred learning needs to provide access to different types of tools than more traditional forms of technologically enhanced education and training.

The TENCompetence infrastructure is validated in a number of pilots studies, representing the variety of contexts in which lifelong competence development takes place [6]. In a first cycle of pilot studies the TENCompetence infrastructure and the Moodle system have been used by different groups of learners. The participants of the pilot studies have been given pre-test and post-test questionnaires. With respect to the research questions, the participants are asked to process pre- and post-test questionnaires. These questionnaires address two main research questions.

- Does the freedom of choice and the tools to handle that freedom, which are offered by the TENCompetence infrastructure, lead to better outcomes than the rigid structures
provided by traditional education?

- To what extent are the tools, which are provided by the TENCompetence infrastructure, helpful in managing this freedom once learners can choose their own learning path and resources?

Pre- and post-test questionnaires provide information about the subjective value or usability of the involved system components but do not provide information about the actual use of a system or combined usage of certain functionality. Furthermore, the subjective information is biased by awareness of the participants. Therefore, we analyse the actual usage of the systems in order to develop a better understanding of the relation of the participants’ perception and use of each system component.

For this purpose, the access logs of the TENCompetence infrastructure and the Moodle system are analysed, because these logs contain data about all interactions, which the participants performed during the pilot study. Nevertheless, the Moodle system and the TENCompetence system component use different logging metrics and protocols; therefore, we had to develop a methodology to make the log files comparable. In the following, we describe the steps and main methods which have been developed and implemented to do so.

**What are log files?**

Log files are transcripts of the activity of a server system. For web-based systems, the server system is the web server including all components that made available through it. These components can be CGI scripts (e.g. written in PHP) or web services that make more extensive use of the server’s internal functions.

For web-applications, there are basically two different types of log files. The first type of log files is the so-called error log or message log. These logs provide insights on the internal activities of the system. Message logs depend on what is reported from the different components of the underlying system. Message logs depend on what is reported from the different components of the underlying system.

Basically, message logs allow components to report their internal activities in a free form format that depends on the interests and needs of the programmers of each component. This implies that available data of a component depends on what a component writes to the log. Moreover, the data found in the message logs can be in a completely unstructured format. This makes message logs suitable for debugging components of a system.

The second type of log files is the access log. Access logs are used by web servers to report any request that had been made to the system. These log files provide data about the external activities of a system. For web servers, these logs contain data about the requests issued by web browsers or similar systems to a web server. The data that is stored in the access logs is mostly independent from the component that actually served a request. More importantly, the data stored in access logs is clearly structured and well defined. For web systems, there exists a limited set of standardised structures for access logs. These structures commonly include the source of the request (the host name or IP address of the machine on which the web browser runs), the type of request, the requested URL, the user name of authenticated users, and the success state of a request. Such standardised structures make the access logs suitable for statistical analysis about the actual usage of a system. Therefore, there is a long tradition of analysing access logs in order to infer knowledge about the actual use of web-based systems [1, 4, 5, 7, 8].

Some information in the access logs depends on the components that handle the particular request. This is particularly the case with user information. Many scripting frameworks make no or little use of the mechanisms of the underlying web-server for reporting authenticated users back to the server. I.e., the user information of authenticated users is not stored in the access logs, although users authenticate with systems that use such frameworks. Interestingly, some systems replicate the server system’s logging facilities. An example for such a replication is the internal access log of the Moodle system. If such component-specific access logs are available, it can be (partially) converted into the standardised log formats because they provide basically the same information as the server system’s access logs [5].

**Cross-system log file analysis**

Previous research on log file analysis has focussed either on the usage of a system, on the usage of variations of the same system, or on the comparison of low level access statistics of different systems, which is often based on outputs of tools, such as analog or webalizer. The approach of cross-system log file analysis

---

1. [http://httpd.apache.org/docs/2.2/logs.html](http://httpd.apache.org/docs/2.2/logs.html)
3. [http://www.mrunix.net/webalizer/](http://www.mrunix.net/webalizer/)
that is discussed in this paper, addresses the retrieval of higher level information about the actual use of systems with structural differences. This requires some homogenisation of the access logs as well as more knowledge about interaction patterns of each system that is included in the analysis. Therefore the cross-system log file analysis has two steps: 1) the log file normalisation, 2) the action analysis.

**Log file normalisation**

While comparing access logs of different systems, log file normalisation is required in order to have homogeneous data sources. This step is always required if the systems use structurally different access mechanism to store interaction footprints to their logs, which is the case with the TENCompetence Infrastructure and the Moodle system. The normalisation aims at the harmonisation of the log files of the two systems. Without this step the different log files will lead to incomparable data sets.

The log file normalisation can be conducted on two levels either on the user-session or the activity type.

At the level of user session, the normalisation separates all sessions of different users. A session includes all requests from one IP address that were handled within a given timeframe. The duration of that time frame is defined by the time that has passed between two requests. If two requests from the same IP address were handled within a time limit, the two requests are treated as part of the same sessions; otherwise they belong to different sessions. However, IP address and time limit are not sufficient in environments such as Internet cafés or computer labs in universities. For that purpose the user name has to be used as an additional constraint, i.e. if two requests from the same IP address were performed within a time frame but associated with different user names, the requests belong to different sessions.

At the level of activity types, the normalisation isolates the tools offered by the virtual learning environment and removes all but one request of an action sequence. An action sequence covers all accesses to the same tool which are not separated by requests to another tool. Non sequential requests to the same tool remain unaffected by this step. After the activity type normalisation each usage of a tool of a system is represented by one request. This eliminates the differences of the systems which are the results of differences in the underlying system architecture. Because these implementation dependent differences are removed, it is possible to compare the user sessions of the different systems directly.

Normalising regarding the activity types depends on the ability for identifying the activity types. This requires knowledge where the different systems store the information about the activity types in their log files. For the TENCompetence infrastructure this information can be found encoded in the URI of an action, while Moodle stores this information as part of the “action” field of the log database. Together with this information both system store also the kind of action, i.e. if a user contributed information (such as posting to a forum) or if a user was just accessing the information provided by that tool (such as downloading a resource from the document repository). The log file normalisation has to take care that contributing and reading information can be identified in both systems, separately.

**Action analysis**

After the log file normalisation the different components of the system, it should be possible to compare all information from the log files of both systems directly. In practice this is not always possible, because there is no standard naming convention for the different tools in learning environments. Therefore an additional alignment of the tool names of the systems is required. This tool alignment already highlights where the systems have structural differences. Table 1 shows the tool alignment for the TENCompetence infrastructure and the Moodle system as they were detected in the log files of the pilot studies that have been already conducted. From this table it becomes visible that tools related to competence development are specifically to the TENCompetence infrastructure, while the tools forum, item, and action are only available in one of the systems.

Given to the structure of the normalised log files, the analysis of the systems can be conducted on four levels: 1) Tool level, 2) User level, 3) Session level, 4) Time level.

On these levels a direct comparison of the log files can be performed by using descriptive statistics, i.e. it is possible to compare the absolute and relative values from both systems. These descriptive statistics provide information on the following dimensions:

- Access times
- Actual users
- Independent sessions
Overall tool usage
- User activity (number of different activities per session)
- Frequency of system use of returning users
- Drop out
- Frequency of tool usage (total and per session) per user
- Session structure

Changes of the session structure over time

While log file analysers are already capable to provide descriptive statistics on these dimensions, the initial log file normalisation is required to understand the differences in using the investigated systems.

Table 1 Relations of the tool names of the TENCompetence infrastructure and Moodle

<table>
<thead>
<tr>
<th>TENCompetence Infrastructure</th>
<th>Moodle</th>
</tr>
</thead>
<tbody>
<tr>
<td>registration</td>
<td>course + enrol</td>
</tr>
<tr>
<td>action</td>
<td>?</td>
</tr>
<tr>
<td>assessment</td>
<td>assignment</td>
</tr>
<tr>
<td>competencedevelopmentplan</td>
<td>course</td>
</tr>
<tr>
<td>competenceprofile</td>
<td>-</td>
</tr>
<tr>
<td>competences</td>
<td>-</td>
</tr>
<tr>
<td>item</td>
<td>?</td>
</tr>
<tr>
<td>resource</td>
<td>resource</td>
</tr>
<tr>
<td>user</td>
<td>user</td>
</tr>
<tr>
<td>?</td>
<td>forum</td>
</tr>
</tbody>
</table>

Cross-system log file analysis for hypothesis testing

The purpose of the approach is not to provide descriptive statistics of the system usage, but to use these statistics for hypothesis testing. In order to do so, the research questions need a translation into the dimensions that are found in the log files, and a definition of expectations on what will be detected in the log files of the different systems with regard to the related dimensions. In the following it is shown how this is done for the two key research questions of the TENCompetence pilot studies that have been introduced earlier in this paper.

The first research question addresses the structuring and the quality of the learning processes. The question has two core implications regarding the user behaviour: firstly, the "freedom of choice" implies that users will take advantage of this freedom and use the available tools more freely according to their actual learning needs; secondly, the question assumes improvements of the learning outcomes. The first part of the question can be directly related to the session structure and the user activity. The second part of the question is more difficult to translate into activity patterns. There are two dimensions of the log file analysis that can get used as quality measures: the drop out rate and the frequency of tool usage per user.

For the results of the log file analysis it is expected the session structure differs significantly for the users of the two systems. Therefore it is expected that Moodle users will have more similar session structures because of the more rigid curricular approach, while the users of the TENCompetence infrastructure show greater variations in their session structures because of the freedom that is provided by that environment. Furthermore, it is expected that the users of the TENCompetence infrastructure use a greater variety of tools, compared to those users of the Moodle system. Regarding the quality measures fewer drop outs and more frequent use of the different tools is expected for the users of the TENCompetence infrastructure.

The second research question for the pilot evaluation addresses the tools that are provided by the TENCompetence infrastructure specifically to support competence centred learning. This question implies that the tools, which are provided by the TENCompetence infrastructure specifically for competence development, are used for planning and self-
assessing the personal competence development. In terms of user actions this is reflected in the log files on the dimensions tool usage, session structures, and the changes of session structures over time.

With regard to these dimensions it is expected that the majority of the users of the TENCompetence infrastructure use the competence profile and competence information tools for planning their learning paths, and the users frequently use these tools for organising and managing their learning activities. Furthermore, it is expected that the structure of the user sessions changes towards more variation and more flexible use of other tools, if the users make more use of the competence profiles and of the information about their competences.

**Conclusions and further research**

The results of the log file analysis can be used for questionnaire validation. This kind of validation reduces the gap of self-recognition of activities and opinions, and the actual performed activities within a learning environment. This provides a more detailed picture than opinion based evaluations could do alone. For example, users may report that they appreciate the availability of a certain tool, but they never use it during their learning activities, or the other way around. Therefore, the log file analysis can be used as an instrument that puts the results of a questionnaire study in direct relation with the actual user behaviour.

The differences between virtual learning environments and the variation of complex usage patterns regarding their impact on the actual learning processes have received little attention by recent research. Particularly, for software systems, which offer new approaches to learning, such comparisons become increasingly important for analysing the benefits compared to established learning environments. This paper discussed the use of cross-system log file analysis for estimating the quality of the results from other empirical evaluation methods with regard to the hypotheses under investigation.

Further research on this approach heads towards two directions. First, it has to be analysed to what extent the results of a cross-system log file analysis can verify the results of pre- and post-test based evaluations methods. Second, it has to be investigated to what extend cross-system log file analysis can be applied for analysing networked learning environments in which different systems and services facilitate a unique learning experience. This second research thread will become of greater interest as Web2.0 techniques will become more important in the organising the functions of virtual learning environments.

**References**


Turning university professors into competent learners
(or how to interweave a new educational methodology with a tool for Lifelong Learning)

Eliza Stefanova, Miroslava Ilieva, Nikolina Nikolova, Krassen Stefanov
Sofia University
Faculty of Mathematics and Informatics
1164 Sofia
5, James Bourchier Blvd.
Email: {eliza; miroslavai; nnikolova; krassen}@fmi.uni-sofia.bg

Abstract: This paper presents the results of a pre-pilot experiment offered in Bulgaria for teachers’ trainers who have to update their skills using ICT in teaching. The pre-pilot became a synergy of results of two European projects – the Leonardo Innovative Teach (I*Teach) project and the FP6 TenCompetence project. The methodology for building ICT-enhanced skill, developed in the frame of the I*Teach project, was applied for training teachers how to use ICT, using the provided by TENCompetence project tools and infrastructure.

Keywords: ICT-enhanced skills, Teachers training, Virtual community

1. Introduction
Lifelong competence development is a crucial need identified for the contemporary information society. In order to provide adequate conditions for everyone to participate in the lifelong competence development, we need to introduce a lot of changes in society – political, social, technological, etc. In order to stimulate these changes, European Commission launched several research programs, aimed to support the process of change.

The TENCompetence project [1] is one of the major responses of the research community towards finding a solution to the above mentioned society need. It is an Integrated Project in the 6th FP of the EC, in the IST – Technology Enhanced Learning priority. The project has three main objectives:
1. To research and develop an easy-to-use, integrated, open-source, standards-based, extensible and sustainable European infrastructure for lifelong competence development.
2. To ensure the validity and viability of the approach during the project by performing real-life pilot implementations in different organisational and international settings.
3. To ensure the sustainability of the infrastructure by creating opportunities and training for new innovative European organisations in the field of lifelong competence development.

This paper presents main achievements related to the second main objective, during the pre-pilots in Bulgaria for teachers’ trainers who have to update their skills in applying ICT in teaching. The pre-pilot was organized in July in Sofia and becomes a synergy of results of two different but related European projects – FP6 TenCompetence project [2] and Leonardo project Innovative Teach (I*Teach) [3].

We are presenting the main pre-pilot characteristics, the main challenges for the trainees, and main results from the pre-pilot.

The main research questions addressed during the TenCompetence pre-pilot were the following:
1. To discover the optimal way to interweave both mastering the I*Teach methodology and an application of the new tool (PCM)
2. To search for appropriate methods to present the new methodology and the new tool to trainees with a high professional level in the context of both ICT and teaching
3. To find the right balance between the face to face and distance training, enabling training on-the-job learning to be implemented.

By finding the right solutions of above mentioned questions we have been prepared for
the real implementation of the TENCompetene pilot training experiments.

2. The pre-pilot setting

2.1. The I*Teach methodology and the PCM

The methodology for building ICT-enhanced skills [4] is implemented through continuous, repeatable activities and gradually accumulated experiences leading to concrete goals by performing specific tasks. This methodology tries to find the balance between the full freedom of the learners, as one extreme, and the strict following of detailed directions, as another. A series of sample educational scenarios have been designed to support the methodological framework. An I*Teach scenario represents a composition of tasks (to be implemented in the context of an active learning environment) leading the students to an educational goal by covering intermediate objectives (milestones of the learning process). The metaphor behind such a scenario is a path (the process) traced by landmarks (the milestones) leading to the peak (the goal).

Why is it useful to apply the tools, developed in the frame of the TENCompetence project for the I*Teach trainings?

PCM is a tool with the main goal to support peoples' personal and Life Long Competence Development. It is a system which gathers competence related information drawn from sources at multiple levels, and is used to present and edit this information in a context, structure and format which is determined by the user [2].

Our observation shows that the knowledge and competencies gained during the course do not finish with the end of the course [5]. Most of the teachers face new challenges during their work in the class. They feel the need of continuing the exchange of good practices in the professional community formed during the course. Thus we identified a strong need of the trainees to continue their further competence development preserving all the information channels built during the initial training. After short introduction of PCM [6] the I*Teach trainers made the hypothesis that this new tool will provide teachers with a relevant support and ensure their lifelong learning. We considered PCM to be a tool for converting an established professional community in a virtual one, rather than just a tool for communication. In addition, we could place through PCM learning materials and other resources at teachers disposal, as well as to prepare distance training for I*Teach scenarios. But most of all, our expectation was to use successfully the PCM for teachers’ competence development and to give them a chance to continue work on eLearning materials in collaboration with other colleagues and students.

A tool like PCM is a perfect platform for putting the idea of collective intelligence [8] in action.

2.2. The Trainers

The main problem with introducing a new toolkit is that often the emphasis is on the tools rather than on the context in which they could be used and on the didactical strategies. With this in mind training was carried out by two teams of trainers: one in charge of applying the I*Teach methodology, and the other - of the TENCompetence infrastructure.

Since it was not possible to upload any learning resources at the then current version of PCM, we proceeded as follows:

- The I*Teach team prepared the instance of the course in Moodle where the Methodology was presented as a group of several word documents, describing the I*Teach methodology and explaining how best it can be used with 3-4 examples, which are called learning scenarios, consisting of several learning tasks, all described in a well predefined templates.
- The TenCompetence team developed a set of units of learning [7] presenting the main ideas of the I*Teach methodology, accessible through the SLED server.

2.3 Selecting the right participants

There were several important arguments determining the selection of the participants in the pre-pilot experiment:

- it was scheduled for the summer (when most of the secondary school teachers are in vacation)
- the participation was on voluntary basis
- in order to promote a new methodology we believed that we had to apply it to teacher trainers first (“you teach as you were taught”)
- we needed people open to new challenges and prepared to learn every day something new
- the PCM functionalities were not fully developed yet and any qualified and constructive recommendation would be helpful

The easiest solution was to invite university lecturers involved in pre-service teachers’
education who already had excellent computer skills.

We, the trainers, faced serious challenges with such a choice, though:

- the setting was reverse – university professors were trainees of high school teachers (3 out of 4 in the I*Teach team!)
- the high professional level of the participants required a special approach in order to convince them in the applicability of the new methodology
- The trainers were expected find an appropriate context for a motivated introduction of a tool with which they themselves didn’t have sufficient experience
- It was not an easy task for the TenCompetence trainers to provide invisible help (an important feature of I*Teach methodology);
- The goals of both the trainers and the trainees should be put in harmony

3. The way to the competence

The duration of half a-day face-to-face training followed by two weeks distant collaborative work and a half a day workshop at the end turned out to be sufficient for the pre-pilot testing.

Unlike all previous I*Teach training [5], the idea was to put the main load of the training on flexible self-adapted distance work, without close supervision of the trainers.

The biggest challenge for the trainers was to put in action a methodology, new for the trainees, in a technical setting, new for both the trainees and the trainers, for a very short time in a natural way, i.e. to interweave the concepts of competences and communities with the interests of the participants.

The intense training started with a 3 minute introduction of each participant, followed by grouping by interests and hobbies and identifying (via brainstorming) topics for competence development.

The next step for the trainees was to create communities based on the intersection of the expressed interests in developing concrete competencies followed by designing a competence development plan (by means of PCM) and finally - to present their work to all the participants.

All these steps were in fact the so called milestones of a typical I*Teach scenario which they had to go through during the face-to-face stage of the training.

During the whole process we relied on the good proficiency level of our trainees and provided them with invisible assistance only when needed. Thus we let them discover the I*Teach methodology by means of PCM functionalities.

3.1. The teams

To form the competence development teams all the participants were encouraged to present their interest in non-standard way – they were asked to present themselves through the area they feel experts and showing 3 things in which they would like to have better competences. After all the participants presented their interest and expertise, next step was to form the expert teams.

The teams were formed on the base of common interests. In each team there was at least one member who would like to better competence in that area and at least one who feeling himself/herself expert. Our preliminary intent and willing was in each team to be included representatives of the trainers – by one of two teams of trainers (in spite of that each team had in advance notion of the other team work the competences of each team of trainers in methodology and PCM tool was different and role in the build trainees team was also different).

The following teams were formed:
1. The team with competence in Arts, with special emphasis on dancing.
2. Communication in natural language.
3. Time management.
4. The family life, with special emphasis on how to become better parents.
5. The development of e-learning courses.

3.2. The first challenge

After the teams were formed in I*Teach style of meta-training [5] the challenge was pose: To develop Community according their interests. Each community to create competence development plan for the competences they decide to work. To propose activities, appropriate to develop required skills, to find adequate resources for each activity. Teams are asked to use PCM for completion the task.

The challenge provides good relationship between I*Teach ideas and PCM tool:
- The team members should distribute their tasks (working on skill working-in-a-team)
- For a short period of time (20 minutes) they should develop joint result - competence
development plan (like working-on-a-project) with support of technologies

- The groups had to search and find learning resources (working on information skills) for the learning activities.

During the presentation of the results phase we saw good examples of interweaving of both ideas.

Each team had 5 minutes to present its results without limit of used presentation tools. We were pleased to realize that within the given 20 minutes all teams succeed to develop community in PCM, to prepare draft competence development plan and to find appropriate resources for planned learning activities.

Participants and mediators discussed what skills were used during performance of the tasks, what problems arose, what methods for the skills development was applied. The participants shared the opinion that challenge was main motivation factor. Finally I*Teach idea was jointly rediscover and all participants feel it is like their “child”.

3.3. Distance work

After the first challenge the second one was presented. During the next two weeks teams were asked to perform distance work. Each group should:

- Fully elaborate the competence development plan in chosen area.
- Describe the scenario and all its learning activities and tasks according I*Teach methodology.
- Collect and develop learning resources

The competence development plan should be described at PCM and should include:

- Learning activities for all intermediate skills and way of action.
- Roles (what are the main roles of participants in learning, which activity to which role is appropriate, which resources are accessible for each role).

The final project (I*Teach scenario) should be developed and presented to the other teams using the native PCM characteristics and components (competence development program, competence, community, learning plan, learning activity, learning resources).

3.4. Final results and feedback

Two weeks later (in the heart of the summer) the participants in TenCompetence PCM pre-pilot put on the table their results.

The date and time for the final face-to-face meeting was initiated by one of the teams – Time management group, which sent an invitation to the other groups. The message was not just an invitation, it carried out two more hidden goals: 1) to encourage the rest of the teams to work more actively; 2) to demonstrate the skills of the team to work in collaboration and to produce short presentation (the invitation was one perfect sample of already good competence in working-in-a-team and short presentation skills built through I*Teach methodology).

All teams answered to the invitation coming ready to present their results (Figure 2). The results surprised all the participants and mostly us, the trainers, with their originality.

The teams showed very good understanding of I*Teach methodology and mastering the skills according it, as well as its implementation in PCM.

Some of the teams had ideas which could not be realised with current version of PCM. Participants gave their recommendations for future development and expressed their interest in some new features.

- More of participants expressed their willing to have hierarchy/ontology of competences;
Some participants worried because the forum and chat were not yet available and communication was realized by other software; and currently there was no option in PCM to describe repetitive activities (such as a cycle of actions with conditions) as done in Figure 3.

![Figure 3. A learning path in the form of a 3D spiral difficult to presented in PCM](image)

One of the most difficult questions arose from the Arts team - how to measure competence development level in such skills like dancing, singing, etc. The team suggested some possible methods for self-evaluation, but question remained open.

4. Conclusions

The most important result of the pre-pilot experiment was that the trainees managed to improve concrete competences of their own in a chosen area.— not just to have one more tool, not just to know how to implement one more methodology, but to improve your self-confidence by proving to yourself that you could be a long-life learner. The enthusiasm shown by all the teams encouraged us to perform the real pilot training with secondary school teachers two months later by using the same strategy.

The understanding that the synergy between I*Teach Methodology and TenCompetence ideas produces promising results raised our confidence during the next pilot experiments.

Another important finding for the participants was that each one of them learned a new thing not only in a relatively new field but even in a field he/she felt an expert.

So finally all the participants were in the roles of both— teachers and learners. Something every teacher (even a university professor) should be comfortable with if he wants to educate life long learners.

Acknowledgments

The work has been sponsored by the TENCompetence Integrated Project funded by the EC 6th Framework Programme, Contract No 027087 (www.tencompetence.org)

Our deep gratitude to Eugenia Sendova, a member of the I*Teach project, for the fruitful discussions and suggestions.

5. References

[3] I*Teach project. Website, retrieved February 2008 from i-teach.fmi.uni-sofia.bg
Monitoring professional changes: analysing practices and creating competence profiles

Elena Boldrini
Alberto Cattaneo
Luca Bausch
Swiss Federal Institute for Vocational Education and Training (SFIVET)

Contact author’s name: Elena Boldrini
Swiss Federal Institute for Vocational Education and Training (SFIVET)
Via Besso 84, 6900 Lugano-Massagno. CH
elena.boldrini@iuffp-svizzera.ch

The present contribution aims to illustrate two main Research and Development experiences led by the Swiss Federal Institute for Vocational Education and Training in the field of the competence analysis and of the creation of competence profiles, in order to monitor and handle the changing professional reality. Basically it deals with the creation of a model (CoRe – Competences and Resources) allowing the identification of an inventory of the resources (in terms of individual capabilities, such as knowledge, know-how, and attitudes) used in professional situations by the workers, and with the consequent reconstruction of their competences and of their competence profile.

Key words: research and development models, competences, competences profile, professional changes, vocational training.

1. Vocational Education and Training in Switzerland: the necessity of reviewing professional profiles

The Swiss Federal Institute for Vocational Education and Training (SFIVET)1, is concerned with the issue of competences analysis and development on two different levels. First of all, this Institution is involved in reviewing the training paths of all the different professional profiles as provided by the new Law on Professional Training (LPT), which came into force in 20042. On the other hand a constant and wider reflection about the changing professional and key competences at work is running in different fields (mediators3, grocers, health professionals).

The reasons of this reviewing lay in the fact that the Vocational Education and Training (VET) is deeply involved in the changes of the professional world. The Swiss professional training system, built on the dual model in terms of an alternation between school and work, also provides a third training environment – that of inter-company courses – thus stressing the importance of the work reality and of the training of professionals. The implementation of this Reform and the discussion of the above mentioned competence profiles have called into question how to face the training challenge in a context that is so changing. First of all, by ensuring an updating of the training paths, secondarily by increasing the flexibility of the competences used in different professional contexts, without undermining the different professional identities. In other words, we wondered what conceptual framework and what methodological path would better lead us to identify the competences for the different professional profiles.

1 For more information on the activities of SFIVET, please go to http://www.ehb-schweiz.ch/.
2 The ultimate aim is to create, as per article 3 of the Law, “a. a professional training system that allows individuals to develop personally and professionally and to integrate into society, in particular in the employment sector, by making them capable and available to be professionally flexible and to stay in the employment sector; and b. a system of professional training that favours companies’ competitiveness” [1].
3 It deals with teachers who have a specialisation in mediation in an educational context.

The present contribution aims to illustrate a unique conceptual framework (CoRe – an acronym meaning Competences and Resources) developed by the SFIVET and two different empirical applications, using two differentiated methodological paths.
2. The centrality of the competence

Some conceptual assumptions are the basis for the definition of our R&D approach in the field of the analysis of the professional sphere of action:

- in order to describe the professional identity of a professional, a reflection about the configuration of his professional profile has to be made;
- every professional profile can be reconstructed starting from the acted competences, that is to say resources used in situations.
- the schedule of the acted competences requires the analysis of the professional practices, which, in turn, build up the sphere of action of a profession.

On this basis we have built, developed and tested a tool for an in-depth study of the professional competence in action: the creation of this tool needs some clarification on two levels in order to make its premises operative:

a) on the theoretical level: it is necessary to theoretically clarify the concepts of competence, situation, and sphere of action;

b) on the methodological side: it is necessary to practically operate with the concept of competence, moving from the theoretical level to the operative one, also defining what instruments we need to analyse it.

a) About the first issue, competence has to be intended as the new interpretative paradigm of the working practices. Nowadays, a professional cannot define his/her identity just by referring to the abilities of a certain job, as these abilities themselves are in constant evolution and even more adapted to the real situations. He/She is even more compared with complex situations, changeable contexts, personal and personalized demands. He/She does not simply practice the profession, but he/she continuously moulds and builds it, by adapting it.

In the perspective which considers competence as an act of integration of resources in action, being competent means mobilising each time, in a suitable way, and in a different measure, resources or partial competences related to the following ambits: subject matter, methodological, social, personal; or using resources that Le Boterf calls knowledge, know-how, attitudes

Only an original combination of these individual resources made by the professional in a way suitable to the context, allows the subjects to face evenemential, unusual, problematic and, as said, non routine situations. This implies that a situated knowledge, i.e. a knowledge that is anchored to the working context, is considered to be strongly embedded in the situation: therefore, we refer to the competence construct, according to Le Boterf, as the capacity to “mobilise” cognitive abilities to handle complex situations; «the competence does not consist in the resources to be mobilised, but in the mobilisation itself of these resources»; in this context, a subject can possess some resources, but not necessarily be competent/skilled.

If we privilege competence – as described, i.e. not in the common accepted meaning of mere ability – as an approach to professional knowledge, then the situation is another concept at the centre of the theoretical system, since we consider competence as knowledge in situ(ation) and therefore always in relation to a system of activities, that as such manifests itself as situation: «competence is defined as a particular way of coupling with the context, as a form of ‘ecologic’ integration between acting and the way in which it manifests itself»

For a definition of situation we refer to the model of the Cultural Historical Activity Theory (AT): this helps us consider that «contextual whole», that «environing experienced world» – to use Dewey’s words – which alone is able to build the analysis unit for acting equipped with sense, which is essentially human. In this context we can note the subjective, social and aimed aspect of human activity, within which knowledge is not given, unless it is situated knowledge. All the professional situations can be set within a sphere of

---

4 Handlungsfeldanalyse in German and analyse du champ d’action in French.
5 Here, ‘resource’ means resources within the person, such as knowledge, know-how, values and attitudes.
6 More generally we could say that this model inserts itself in a trend that considers competence as situated and as resource-in-action: that is to say that a competence resides not only in the resources that make it up, nor in their sum, but in the act itself in which these are combined, integrated and mobilised in situation, for which it is possible to give a competent performance.
7 It is obvious to think about Vygotskij's work, and also to Michael Cole's cultural psychology, and to the work of Silvia Scribner, Jean Lave, Etienne Wenger. For a more in-depth study please see also.
action which is basically the context of action of a profession. Its modelling includes the “actors” involved in the activities, both in a limited sphere (PhA, Pharmacist, customers, products), and in wider sphere (other institutions, suppliers, doctors, health insurances).

b) Of course some behaviouristic models based on the top-down operationalization of the learning objectives [18] and on taxonomisation [19] do exist to define competences (and competences profiles), but they do not focus on the “situation” concept. The Swiss vocational training system itself used to refer to another model to elaborate training plans, which is based on a hierarchically structured definition of the learning objectives. Such a model is named Triplex\(^9\) and foresees three kinds of competences needed to perform a profession: professional, methodological and social competences. The required contents of the training path to acquire the needed professional competences are defined on the basis of a top-down hierarchical system, which is related to three levels of training objectives\(^{10}\); these are generally defined by a group of experts in the concerned professional field. The analysis of the sphere of action is not mandatory.

We created a model which starts from the real situations to be faced by the professional, in order to define the resources and the competences needed to cope with them (professional profile definition); at this point the training paths can be designed to make people develop and acquire the identified competences. In this way a virtuous circle between professional situations, competences and training has been created, as in Figure1.

3. The steps in two different applications

The above mentioned conceptual framework has been made operative and tested in two different prototypical settings: i) for the creation of a renewed training path for the profession of the Pharmacy Assistant in Switzerland (PhA), according to the LPT, based on a study of the professional competences and ii) for the investigation and creation of the competence profile of the teachers who use the ICTs in their didactics\(^{11}\). The first experience was basically a development one, foreseeing a new training curriculum on the basis of the found competence profile; the device developed in that occasion was named CoRe [21]. The second setting was a research one, trying to explore a new field of teaching competences [22, 23].

Consistently with what has been described in regards to theoretical concepts (§2.), the main steps of the two settings – which we will refer to simply as “CoRe” and “ICT” – are common and shared, and can be summarised as follows:

a) Modelling and analysing the sphere of action.

In CoRe, during an initial workshop the moderators present, on the basis of specific literature, a first model of the sphere of action which is discussed and validated with the experts of the professional field involved (2-3 people). In ICT, the researchers individually interviewed some pioneers of the field using the technique of entretien d’explicitation [24, 25], and not using focus groups\(^{12}\), which in their turn can assure a first reciprocal validation of the list of typical situations and of the resources needed; on the other hand in depth narrations provide very detailed descriptions of situations.

b) Identifying the professional and daily situations of the relative resources.

In CoRe, 6 up to 8 professional experts take part in the second workshop, where the most typical situations\(^{13}\) that are usually dealt with by the professionals are identified alongside the resources, under guise of knowledge, abilities and

---

\(^9\) For a brief description of the procedures for elaborating a training plan with Triplex and CoRe, see – in French, German and Italian – http://www.bbt.admin.ch/themen/grundbildung/00107/00365/index.html?lang=fr

\(^{10}\) The three levels are: fundamental objectives, operative and performance objectives.

\(^{11}\) See also [20].

\(^{12}\) All the methodological details and the results are precisely described in [22, 23].

\(^{13}\) Le Plat [26] brings to light how action, and in particular working action, is inhabited by a plurality of rationalities, that have to do with the history of the subject, their objectives, aims, representations and emotions. Work in this sense cannot be considered separately from the man, but on the contrary professional practice is actually embodied in the worker. In other words, work brings with it a double characterisation: on one hand it brings elements of a social, collective, sharing and normative type, while on the other hand it brings subjective elements that are linked to the worker’s individuality and to that of their interpretation of the task (normative, compulsory) that, in this sense, becomes activity (action).
attitudes, put in action within these situations. Each situation is described specifying the actors involved, the activity, the norms, and eventually the tools required to be successful. You can see an example in the attachment. Finally, the list of the situations, resources, competence profile and the training curriculum, after having passed a first theoretical and conceptual verification, are validated by the all the stakeholders in a pragmatic process of consultation.

We could say then that CoRe already starts from the experts’ representations of the most typical professional situations, while in ICT the typical professional situations and the practices acted in them are deducted by the researcher from the collected narrations of the actors.

c) Defining the competences and the competence profile.

In CoRe, starting from a clustering of the main situations and of the related resources, a list of competences is built, and this allows to face these families of situations. The gathering of working situations in the monitoring phases (through the techniques of the focus group), is useful for indexing and for classifying the variability of the working situations in families of similar situations – which have in common goals, actors, and actions.

In ICT, the classification and clustering of the situations are made by the researchers – as said, with the support of two softwares – and not directly by the experts. This fact implies an important difference: the researchers are not experts in the professional field they investigate; for this reason they could classify competences and situations differently from the experts. A final validation with the experts is therefore necessary.

If, as we have seen, our theoretical approach considers the competence as an over-all way of managing working situations, thanks to the fact that it is composed by different resources, orchestrated in situations, then the subject who has a certain type of competence will be able to manage a certain family (or class) of situations, or in other words: a certain category of situations is handled thanks to a certain kind of resources, variously combined and mobilised, according to the goal.

A competence profile is for this reason a limited list of competences, each one described on the basis of the specific resources composing it and allowing to handle a certain typology of situations.

d) Designing the training program.

Especially in CoRe, this elaboration foresees a close continuity between the first steps of analysing the sphere of action and the development of the training programmes; in fact, once the situations and relative resources are defined as well as the reference competences, we proceed to elaborate the proper curriculum, that is the structure of the training path, its content, the pedagogical and didactical directions. The implementation of the training plan has been structured so as to not forget the identified competences (and then the starting situations too); it foresees for example that i. the didactical material is built starting from the resources identified during the analysis of the professional situations; besides, ii. such a material wants the learning contents to be put in close and explicit relationship with the situations themselves, as to integrate systematically (theoretical) learning and professional practice, and so as to show the apprentices in a concrete way that such contents really make sense; iii. finally, it has to be said that the so built curriculum foresees explicitly training “lessons” (in the case of PhA, one hour per week) devoted to the analysis of professional situations: this allows not only to integrate once more theory and practice, but also to enforce one’s own professional identity – thanks to the analysis and the consequent gained awareness on one’s own practice.

In ICT, steps towards the elaboration of a real training program have been made, but not in the

14 In the case of PhA, the situations listed were 51. To see a description of these (in French or German), please see http://www.pharmasuisse.org/fr/media/pharma-assis/reform/bildungsplan/02_Bildungsplan_frz.pdf or http://www.pharmasuisse.org/fr/media/pharma-assis/reform/bildungsplan/01_Bildungsplan_d.pdf.

15 The transcriptions of 45 interviews were analysed both with a qualitative method for the content analysis with the support of the software Atlas.ti, and in a quantitative manner with the support of Alceste.

16 For a reference to the Activity Theory which is the basis for this reflections, see [13].

17 On this last aspect another remark should be done: in ICT, the professionals investigated were all taking part in experimental blended learning projects, representing a best practice and some new tendencies in the teaching competence development; in this, it differs once more from the CoRe model, where we have seen that the experts have been chosen as experienced representatives of their profession.

18 In the case of PhA, the final competences that are included in the professional profile are 12; the same number of families of situations were obtained from grouping the 51 situations identified.

19 For a wider description of CoRe steps please see: [27, 21].
direction of integrating the whole profile in a training offer; rather, we began introducing some elements concerning this profile directly into the qualification course of our teachers at SFIVET. Other developments are by the way still being evaluated.

According to the CoRe-PhA example, the four steps here commented can be represented as in the following Figure 1.

![Figure 1. The scheme of the four phases of CoRe.](image)

4. Arising issues

To conclude, we tried to show here how our embracing the situated concept of a competence on a theoretical level can be translated into practice, considering two different R&D interventions. In particular, it has been shown how we could be very “situated” in the survey phase, in which we collected what a professional does in his/her practice. Finally, we could come back to “situatedness” in the implementation phase: commenting the PhA example, we have seen how our model requires to concretely integrate the concept of “situation” both in the construction of the didactical material and in the delivery of the subjects themselves.

The two derived research and development projects are at the present time at a testing phase in the territory. The training plan of CoRe-PhA has been operative since August ‘07 in the different places of training. The results of the ICT project have been integrated in the training path of the teachers attending the courses at SFIVET. Some monitoring and evaluating procedures are running: in particular for what concerns CoRe, there are meetings with the school teachers and with a group of trainers operating in the Pharmacies of different Swiss regions20, in order to evaluate the quality of the training and of the didactical materials.

The experiences conducted present some crucial points of interest for what concerns i) primarily the investigation of the professional situations and competences acted in the daily job, as basis for handling the renewing of training paths. Just starting from the real professional activities it is possible to define suitable and present-day curricula; ii) secondarily, the centrality of the competence concept, not only on a conceptual and theoretical level, but also in the operative one, seems to be fundamental: competence becomes a core which can be made operational by the indicators of knowledge, abilities and attitudes present in the situations; iii) these experiences allow to use the professional reality in the training paths. From a methodological point of view, a next step for the future is still open: trying to operate both with the representations of the experts - in the form of the focus group and of the narrations – and with the observations on the field (job context) by the researchers, in order to cross the two perspectives.

5. References


---

20 In addition to an online survey submitted to all the involved Swiss Pharmacists.


6. Attachment: Example of the definition of a competence (n.5) and of two situations.

Competence n.5 (sale)
The Pharmacy Assistant has the necessary knowledge, know-how and sensibility to establish personal relationships with the customers. That allows him/her to know their needs and to offer them some adequate advice and support. He/she is aware of his/her limits and knows when to address the Pharmacist.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Preparation of a pharmacy box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actors</td>
<td>Pharmacy Assistant, Pharmacist.</td>
</tr>
<tr>
<td>Activity</td>
<td>The Pharmacy Assistant composes a pharmacy box suitable to various customers’ activities (holidays, sports, first-aid box, etc.).</td>
</tr>
<tr>
<td>Norms</td>
<td>Regulations of the Pharmacy</td>
</tr>
<tr>
<td>Required resources</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>School: Customers’ typology, first-aid materials, pathologies</td>
</tr>
<tr>
<td></td>
<td>Pharmacy: First-aid materials, treatment in case of little urgencies, pathologies</td>
</tr>
<tr>
<td>Know-how</td>
<td>School: Selection of a not too huge range of useful medicines, adaptation to the customers’ needs, sales techniques, communicative sensibility, identification of the customers’ typologies.</td>
</tr>
<tr>
<td></td>
<td>Pharmacy: Selection of a not too huge range of useful medicines, adaptation to the customers’ needs, sales techniques, communicative sensibility, identification of the customers’ typologies.</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Sense of responsibility, precision, flexibility</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situation</th>
<th>Advice in the field of parapharmaceutical products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actors</td>
<td>Pharmacy Assistant, Pharmacist.</td>
</tr>
<tr>
<td>Activity</td>
<td>The Pharmacy Assistant is able to advise the customer on natural, dietetic and parapharmaceutical, hygienic, sanitary and domestic products. He/She is able to give advice on precautionary measures and to propose a personalised treatment. Being the case, after having addressed the pharmacist, he/she advises the customer to consult a specialist.</td>
</tr>
<tr>
<td>Norms</td>
<td>Regulations of the Pharmacy; legal norms</td>
</tr>
<tr>
<td>Required resources</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>School: Natural, dietetic and parapharmaceutical, hygienic, sanitary and domestic products; customers’ typology</td>
</tr>
<tr>
<td></td>
<td>Pharmacy: Natural, dietetic and parapharmaceutical, hygienic, sanitary and domestic products; additional recommendations</td>
</tr>
<tr>
<td></td>
<td>Inter-company courses: Natural, dietetic and parapharmaceutical, hygienic, sanitary and domestic products; additional recommendations</td>
</tr>
<tr>
<td>Know-how</td>
<td>School: Ability to pay attention to the customer, communicative sensibility, persuasion, sales techniques, linguistic abilities</td>
</tr>
<tr>
<td></td>
<td>Pharmacy: Customers’ typology identification, persuasion, sales techniques, linguistic abilities</td>
</tr>
<tr>
<td></td>
<td>Inter-company courses: Customers’ typology identification, persuasion, sales techniques, linguistic abilities</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Sense of responsibility, accuracy, sense of touch</td>
</tr>
</tbody>
</table>
Abstract

Introduction:

The Peoples Open Access Educational Initiative’s (http://peoples-uni.org) aim is to deliver public health education that is of high quality as well as low cost. A key requirement is to develop appropriate public-health competences.

Methods:

The subject selected for the pilot module was maternal mortality. Competences, were dictated by and through the requirements and needs for learning and building public-health capacity.

Results:

Assessment of identified competences was based on published competences, but these required modification for problem-based learning and the settings that they are being used in.

Conclusion:

Peoples-uni.org has achieved several successes, which suggest that building an on-line, accredited Diploma in Public Health is not an impossible aim and this is because of its aim of building education and skills development around Open Education Resources, to help with capacity building in developing countries and because the educational model includes competence and problem based approaches.

Keywords:
Competence, public health, online-education
Introduction

Last year, the UK government announced its commitment to helping developing countries to tackle their public health problems (1). These problems are an issue for many developing countries, and capacity to deal with them is limited. Locally delivered public health courses, (especially those that deliver at Masters level), are heavily oversubscribed in the countries where there is the greatest need. UK Universities charge high fees to overseas students. This limits the capability of both parties (providers and participants) to contribute to public health capacity-building in developing countries. In addition, most learning provided by British universities is naturally UK focused – dealing with UK flavoured issues and problems; and therefore focusing on models of delivery best fitted to the Western world.

“Development of academic partnerships between developing and developed countries is a sustainable approach to build research capacity in the developing world.” (2)

Increasing amounts of open source educational material, as well as delivery mechanisms, are now available through the Internet. For example, the Open Courseware Consortium (3) features several detailed public health courses, though these are focused on the home countries of the universities providing them, not developing countries. Wiki-technology has allowed courses to be developed (4,5) but while some of these provide courses, they’re not to Masters level and where materials are provided, they’re not always accompanied with a coherent course of study. However, we have not been able to find examples where OERs are used as the basis for public health education, or where such education is planned outside the traditional university sector, in the way we propose (6).

So, with this in mind, we decided to develop the Peoples Open Access Educational Initiative (http://peoplesuni.org) – established in 2006 as a loose association of interested parties. Its aim is to deliver public health education that is of high quality as well as low cost, using the open-access resources that are available.

Obviously, in setting up this course, a key requirement was to develop appropriate public health competences and explore the assessment possibilities. As straight-forward as this sentence sounds, it doesn’t take into account the consideration that went into deciding which competences we should include.

Once these had been established, could we assess achieved competences mapping them against internationally recognised standards to ensure that we were building meaningful and useful public health training?

The next question was: could we do this outside the traditional university system, making learning flexible and more responsive to the needs of participants?

The early stages of developing the Peoples-uni and a first course in public health began in September, 2007 with the piloting of a module on the subject of maternal mortality.

Methods

The process of establishing and delivering the courses and was used to set up the pilot module. This was as follows:
1. Identify a health problem.
2. Identify the educational need (such as Masters level for health professionals or ‘train the trainers’).
3. Identify the competences required.
4. Identify the on-line resources required.
5. Develop a set of focussed discussion topics for tutor/facilitators to lead on-line groups, using a learning management system (currently Moodle).
6. Assess and accredit learned competences.
7. Do this across a range of relevant problems to cover a whole set of competences to build a public health course.
8. In addition, the course developers are committed to revising the resources as they are used, in order to ensure local relevance.

The subject selected for the pilot module was maternal mortality – a key public health issue. Competences, at this stage, were dictated by and through:
• The requirements and needs for learning and building public health capacity in developing countries;
• The Maternal Mortality module’s focus and topics;
• The experience and views of the module’s developers and facilitators.

The module had five topics. The process involved developing headline competences for each topic, focusing on the aim of the learning and used these to determine the assessment. Each of the topics ran for two weeks of discussion. The delivery of the module was through problem-based learning. Participants were required to read the peer-reviewed materials and discuss questions raised to meet the competences.

Results

The Pilot - Delivery

The module was delivered over ten weeks to fit between the end of Ramadan and the onset of the Christmas and Eid festivals. There were five topics based on competences and three assessments (one formative). There were several general and content-expert facilitators. 38 students from Pakistan; Turkey; Democratic Republic of Congo; India; Nigeria; Sudan; Ghana; and the USA signed up to the course, after limited publicity, and their backgrounds ranged from clinicians wanting public health perspective to policy-makers and programme leads.

Communication was in-depth and discussion was lively – possibly because all were aware that this was a pilot and were keen for it to succeed.

The Pilot - General Issues

The key issues for running the pilot were:
• Educational materials
• Delivery mechanism (ICT and tutors)
• Accreditation of learned competencies

Looking at course delivery and teaching, the following organisations and people have played a vital role. UK/US universities have donated some of their course materials. Facilitation and guidance has been carried out by volunteers – the Diaspora who want to ‘give something back’; retired academics, and; health service professionals. However, the focus here is the competences.

The Pilot - Competences

Assessment of identified competences was based on published competences, but these required modification for problem-based learning and the settings that they are being used in. Furthermore, to add weight to value of the training, external accreditation was sought from the Royal Society of Health. Exploration of these issues and discussions continue.

The Pilot - Module Evaluation

19 students had completed the evaluation questionnaire by early January, and the overall response was very positive. Some of the key results are shown in the following tables:

Table 1: Student motivations to participate in the Module

<table>
<thead>
<tr>
<th>Reason</th>
<th>Very important</th>
<th>A little</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>To get academic credit</td>
<td>9</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>To gain public health knowledge</td>
<td>15</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>To gain public health skills</td>
<td>15</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>To look at the resources</td>
<td>12</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>To join in a discussion with others</td>
<td>12</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>To get experience in e-learning</td>
<td>11</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Other reasons</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is obviously commitment to building
discuss problems and solutions with colleagues from around the world.

Table 2 alleviates some of the concerns that the organisers and facilitators had about the technical delivery of the course – especially after the server failure.

Table 2: Student assessment of the module aspects.

<table>
<thead>
<tr>
<th>Course Benefits</th>
<th>Ex’nt</th>
<th>Good</th>
<th>Useful</th>
<th>Not of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>The general interest of the course</td>
<td>8</td>
<td>8</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>The academic value from the course</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>The practical value from the course</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>The input to the discussions from other students</td>
<td>5</td>
<td>11</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Input to the discussions from facilitators</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Discussion

Module Evaluation

The participants’ focus on developing public health knowledge and skills (Table 1) reinforces the need to develop appropriate competences. While learning is interesting, the usefulness of any newly acquired knowledge and skills to improve service-delivery is determined by whether it helps the participant become an effective and competent practitioner. The use of on-line learning also provided an opportunity, not easily available through institution-based learning, to discuss problems and solutions with colleagues from around the world. The structure and format of delivery are appropriate – files were kept small because of internet access issues (Table 2). Many of the students reported that they were participating from internet cafes so ease of downloading materials was very important to them. This will inevitably restrict some of the materials that can be provided and therefore impacts on how the competences can be assessed. In the interests of transparency and realism, it is essential that the process (of determining both the competences and assessment criteria), recognises the possibilities and limitations of the materials.

Development of Competences

The Pilot has demonstrated the need to assess participants’ work against recognised public health competences, even though the participants themselves did not focus on the need for academic credit. Work, by the course developers and facilitators, has explored existing lists of public health competences from the UK, US and Canada.

These were mapped to the Peoples-uni aims and objectives. Published competences require modification for problem-based learning and developing country settings. For example, the UK’s competences are tied up in the Faculty of Public Health’s training programme for consultants and assessed through ‘on the job’ training, while the People’s University participants are not in any such environment. Similarly, competences from the US and Canada, while focused on skills, are linked to working in developed countries. Means of assessment has also had to be taken into account. The skills requirements are being, and need to be, generated by academics, employers, students, professional associations, etc. What is developed for use locally (and delivered by any course) has to be consistent with agreed generic competences, taking account of local methods, technologies, and resources. Competences are also being refined over time by all course users and suppliers – facilitators and those providing the materials. These are ongoing processes.

Most importantly accreditation is being sought from academic bodies and/or employers and professional associations. Assessment is still being discussed but the key aim here is for transparency – both during the course and from the point a student considers enrolling. With this in mind a stable URL will be created where the competence definitions can be held and updated.

Discussions are now underway with the Royal Society of Health to explore accreditation of work.
The Future

The pilot Maternal Mortality module has been a successful exercise – in exploring competence development and most importantly, as far as the participants are concerned, delivering useful public health education. Further modules are to be developed to form a Diploma of Public Health. Demand was highest for the following subjects – suggesting that a generic, skills-development approach would be most useful:

• Research methods
• Health economics
• Disease surveillance
• Public health preparedness, disaster and emergency planning
• Health statistics
• Evaluation of interventions
• Epidemiology
• Health policy

Competences and their assessment criteria will be listed on permanent pages of the website – available to all of those considering enrolling on the modules.

Remaining Issues

All of the work undertaken (course development and delivery, facilitation and exploration of competences and accreditation) on the Peoples-uni has been carried out by volunteers. The greatest needs are to:

• Identify volunteer tutors/facilitators and content experts.
• Identification and delivery of materials.
• Develop six more modules to build into a diploma course by September, 2008 – ensuring that the competences match the needs of developing countries.
• Agree accreditation with an appropriate body.

All of this work is ongoing.

Conclusion

In the future it is anticipated that graduates of the initiative will take a leading role in course development and delivery – these are the people who know best how the courses can best meet the needs of workers and of the populations they serve.

However, at this stage we have achieved several small successes, which suggest that building a cheap, on-line, accredited Diploma in Public Health is not an impossible aim:

• Peoples-uni.org has generated interest and support because of its aim of building education and skills development around Open Education Resources.
• Our educational model includes competence and problem based approaches.

However, the potential for success still relies on volunteerism, though we have been successful in ‘recruiting’ advisors from an array of backgrounds and locations. Remaining unsolved issues that are being dealt with include developing an appropriate business model. There also issues over providing materials and information to participants with very limited internet access – this is being investigated. Talks have begun with the Royal Society of Health on the matter of accreditation. We are still at an early stage and will appreciate all help, advice and collaboration.

References

Social Software for Lifelong Competence Development: Scenario and Challenges

Ivana Marenzi, Elena Demidova, Wolfgang Nejdl, Daniel Olmedilla
L3S Research Center, Hannover, Germany
{marenzi, demidova, nejdl, olmedilla}@L3S.de

Abstract
Within the TENCompetence project we aim to develop and integrate models and tools into an open source infrastructure for the creation, storage and exchange of learning objects, suitable knowledge resources as well as learning experiences. This contribution analyzes the potential of social software tools for providing part of the required functionality, as well as some challenges involved.

1. Introduction
During the last three years, the Web has entered into a second phase, known as Web 2.0. New services and software have transformed the Web from being a predominantly read-only medium to one where anyone can publish and share web contents. Web 2.0 tools promote different types of communication: one-to-one, one-to-many, or many-to-many, synchronous and asynchronous, and can be used to search, share and create different media: from text (Blogs and Wikis) to images in Flickr, audio, podcasting and video in YouTube. Given the information overload that is created by the exponential growth of content on the Web, other tools help learners filter and manage information (social bookmarking and RSS feeds). The use of these services has provided new means to share knowledge, exchange ideas and easily publish work.

Social software at its core is based on supporting individuals to interact socially and to achieve their personal goals, together with people who have similar interests. It works bottom-up: people sign up to a system and form communities through personal choice and actions. Their desire to organize themselves into groups and to collaborate by advancing personal interests contrasts with more traditional approaches where people are placed into organizationally or functionally-defined groups.

In contrast, traditional LMS still approach group membership in a top-down fashion. In current learning environments and in corporate settings, it is hard to imagine a single person acting without some specifically assigned membership (in a class, a working group, a team or a division). Social software will change the traditional way in which learning systems, groupware and other project-oriented collaboration tools work. People start using social software individually; they advance their own biases and connections, and reflect them in social relationships in everyday life. This process is not organized in terms of a single, clearly defined project; rather, it is a people-driven world, in which social interactions are inductive, passing from individual to a group, to other people and other groups. This approach may appear untidy and approximate, but often is a better method towards forming strongly motivated groups and working teams.

In our project context we want to address the following questions:

- What happens, if social software is used in formal learning or work environments, and how can it extend the functionalities of traditional learning or work environments?
- How can the essential elements of social software be incorporated into more conventional software solutions, ultimately
transforming learning communication and working collaboration, and which challenges do we have to address to achieve this integration?

The use of Blogs, Wikis, media-sharing services, and other social software, has been shown to create exciting new learning opportunities for people, and to support creation of social networks and communities of practice among company employees [1, 5]. The learner is seen as a participant who is actively engaged through a rich set of interactions within these communities. At the same time, the worker must fulfill three workplace roles: working, learning and collaborating with other colleagues. In this paper, we sketch, in a scenario-oriented way, how people can interact in their working environment to create, search and share knowledge resources [3, 4, 5].

2. TENCompetence Background
TENCompetence addresses the need for flexible and effective lifelong competence development and aims at supporting individuals, groups and organizations by establishing the most appropriate technical and organizational infrastructure, using open source, standards-based, sustainable and innovative technology.

To integrate models and tools for creation, storage and exchange of knowledge resources, in the first project stage we implemented the KRSM infrastructure [2] making information accessible to better support lifelong learning and enhance learning experience. This infrastructure brings together information stored on institutional servers, centralized repositories, locally on learner desktops (by means of P2P technology) and online community-sharing systems like Flickr and YouTube. The KRSM architecture is depicted in Figure 1.

In the next project phase we plan to extend the integration of Web 2.0 applications to support a variety of scenarios, one of which is described in the next section. Whereas in the current KRSM architecture Web 2.0 applications like Flickr and YouTube are only considered to be information sources for existing services, in the next project stage we aim to combine functionalities of existing Web 2.0 applications (tagging, bookmarking and commenting) into an integrated LearnWeb 2.0 platform for sharing, discussing as well as for (possibly collaborative) creation of knowledge resources.

3. Scenario and Challenges
We start with the observation that software development needs to be interpreted and described not from a technological standpoint, but in terms of potential use. Thus we start with a short scenario and then analyze the challenges and design choices arising from that scenario.

3.1 Scenario Higher Education / Need for Interoperability
Our main actors in this scenario are ICT technicians who support different projects and people in a university environment. Technology is used at different levels of the organization: work (store and share knowledge resources), teaching (present and provide learning materials), learning (for workers and students).

Each technician works on several tasks, but communication among colleagues is only performed in person or via e-mail, without any synchronization or support. Too often, a technician does not know what the others are doing, even if their work is relevant for her tasks. Resources are stored in different databases, which are neither linked nor interoperable; discussions take place ad hoc and are not stored, best-practice transfer is manual and ad hoc, and not supported by any system.

Figure 2 depicts some of the technicians’ tasks and contextualizes some possible applications of Web 2.0 tools in our scenario. For instance, Blogs and Wikis can provide cross-project
communication, creating a useful knowledge repository and allowing easier review, reporting and sharing of activities. Every technician could then browse and subscribe to them through RSS to keep updated on relevant news. Web 2.0 tools can be used to foster interactivity, communication and collaboration.

![Figure 2: Technicians' Activities](image)

Other examples include the adoption of Instant Messaging to communicate and share information within the technician group with lower costs (compared with telephone calls) and the advantage of saving data in a chat. RSS feeds and social bookmarking can help to track changes and news, replacing the staff newsletter. Blogs and social annotation tools support project discussions and development of technical plans. The instant, secure and constant accessibility of data in searchable format, which Blogs provide, can be a huge productivity improvement in sharing information. Wikis and mind mapping can help in creating a knowledge base of good practices and preparing the agenda for delivering the minutes. Forums can be used to keep track of courses and exams procedures as well as Podcasts as an alternative or supplement to traditional face-to-face training activities, to facilitate IT support for university employees and part-time students.

Also the possibility of using new means of sharing between different institutions is worth investigating:

- social bookmarking in existing online library services (including online catalogues and online information resources such as e-journals)
- video-conferencing and content sharing to customize university courses
- reuse and sharing knowledge resources between different universities to improve the learning quality
- forums where students can speak about their experiences at the university.

Providing integration and sharing among these different kinds of tools is crucial, though. Already with current ERP solutions, integration of diverse systems turned out to be a challenge. Applications "do not converse": they do not share data and do not concur to re-use services or applications in a uniform / interoperable way.

With Web 2.0, we have to integrate new application types into this already complicated environment, to provide functionalities for knowledge resource sharing and exchange. Retrieval of heterogeneous knowledge resources among different tools and social network services is still too difficult. We would like to collect relevant information about different knowledge resources, gathering them in an integrated environment from where they can easily be accessed. This should be provided via a distributed and modularized infrastructure, but allow some means of centralized user authentication or Single Sign On (SSO) functionalities, to avoid having the user need to log in several times, for each tool integrated in our environment.

### 3.2 Challenges

Web 2.0 is a challenging environment, in which knowledge resources are distributed among a set of heterogeneous online storage tools, each providing specific functionalities. Whereas each online application supports a limited set of pre-defined tasks (like storage, editing or discussing...)

---

of resources), our LearnWeb 2.0 integrated environment aims at offering a rich set of functionalities over the whole virtual working space containing the entire set of distributed resources, without unnecessary boundaries.

Existing Web 2.0 tools differ in programming languages, granularity degree of their APIs, and licensing system. Among the great number of available tools, only a few are delivered with an open source license, which allows them to be customized and seamlessly integrated in a centralized environment. Whereas many tools are copyrighted, some of them deliver their API, which allows for integration of their services in LearnWeb 2.0. When neither the source code nor an API is available, they have to be linked as external tools.

Our work on LearnWeb 2.0 will address two main challenges in the coming months: a) Integration and Interoperability and b) Identity Management. We discuss these two challenges and possible solutions in the following sections.

3.3 Challenge 1: Integration and Interoperability

Our LearnWeb 2.0 infrastructure aims to provide rich functionalities within a single environment as a combination of services provided by Web 2.0 systems.

Content provided on Wikis, Blogs, Forums, Podcasts and other tools need to be integrated in a way that makes access to these distributed resources as easy as to learning materials in a conventional LMS, and also provide the entire set of required functionalities. Technical integration of different Web 2.0 applications can be performed at different levels. We consider three possible integration degrees: basic, partial and complete. An example of basic integration is linkage of resources provided by one application (for example, a photo in Flickr) from another application (such as a document in Google docs). This basic integration level does not require lots of implementation effort (in fact some existing Web 2.0 applications provide such basic integration by means of links to external resources), but does not really help the user to reduce manual efforts, as all references need to be created manually. A more tight (partial) integration can be achieved by putting one common application on top of the APIs provided by the different Web 2.0 tools. Unfortunately, most of the available APIs are application specific and functionally limited, making even partial integration difficult.

Full integration (the most difficult to achieve) would result in a common system that provides the entire set of functionalities of all applications in an integrated manner. For example, in such a fully integrated system we could drag and drop a Flickr picture to a document written in Google docs. Although at the first glance full integration seems to be the most preferable choice, it needs to be performed in a modular way, preserving the ability of future updates of integrated tools.

One possible approach to achieve such technical integration is to define a set of common interfaces for the core services, such as SQI [6] for search. However, heterogeneous APIs require creating specific wrappers, like SQI wrappers implemented in the KRSM system for YouTube and Flickr integration. One disadvantage of this approach is that such wrappers need to be created for every application to be included. Another problem is that not all required functionality of the Web 2.0 applications can be accessed through their APIs. For instance, the YouTube API does not allow for video upload.

To address this problem in LearnWeb 2.0, we currently investigate a set of core services to be fully integrated and look for suitable tools providing them. In the next phase we will extend the list of supported functionalities by adding new tools using tool- and service dependent degrees of integration. In order to support the core discussion functionality described in our scenario, we will first install freely available Wiki and Forum software on a LearnWeb 2.0 server and then connect services of the other tools like Flickr using their APIs.

Apart from integrating components on an operational level, semantic interoperability has to be provided. Currently, most of the search facilities of the available Web 2.0 applications rely on keyword search using tags. We expect more semantic search features to be added in the future, raising the question of semantic
interoperability. Also, some of the tools provide more expressive query languages than the others. Some allow only retrieving single resources, whereas others like Flickr or GroupMe\(^2\) support resource aggregation.

3.4 Challenge 2: Identity Management

LearnWeb 2.0 will need to provide means of seamless user authentication for every application it integrates. Having to log into a multitude of separate applications would, besides the generated nuisance, slow down search and learning processes significantly.

One of the popular approaches for Single Sign On in a university environment is Shibboleth\(^3\), which supports cross-institutional sharing of access controlled web resources. Unfortunately, targeted Web 2.0 tools as well as the users of the LearnWeb 2.0 are typically not a part of any specific organization, reducing the applicability of Shibboleth as a solution candidate.

Another interesting approach for SSO in a Web environment is provided by OpenID\(^4\), an open, decentralized, free SSO system for user-centric digital identity. Using OpenID-enabled sites, Web users do not need to remember traditional authentication tokens (username, password) for every site they want to visit. Instead, they only need to be previously registered on a Website with an OpenID identity provider. As OpenID is decentralized, any Website – regardless its institutional affiliation – can employ OpenID for users to sign in. OpenID takes advantage of already existing Internet technology (URI, HTTP, SSL, etc.) and employs identities that people have already created for themselves in their blog, photostream, profile page, etc. OpenID does not solve all problems, though. Although many sites already support it, in order to be useful for a fully integrated environment, OpenID needs to be integrated in every included site. Thus selecting OpenID still restricts possible choices for the tools to be integrated.

An important consideration for designing LearnWeb 2.0 is that most users already have their personal accounts with many applications to be integrated. These user accounts can be accessed through the Web interface of the specific tool. Users need to access their own resources, contacts, and bookmarks already available in the Web 2.0 applications through the new integrated environment. One possibility to provide SSO for LearnWeb 2.0 is to keep authentication data required by each application encrypted in a single place (locally by the user or on a trusted server). In this way, the data for a specific application can be decrypted and used to authenticate the user, only requiring the user to provide one password for decryption. The advantages of this approach are its simplicity and independence of the target application.

4. Conclusions

Internet has changed the way people acquire and share knowledge. Web 2.0 infrastructures will change the way people exchange knowledge and interact. In this paper we used one scenario to find and discuss some challenges for integrating social software tools in our LearnWeb 2.0 infrastructure, and sketched some preliminary ideas towards implementing this infrastructure.

5. References


---

\(^2\) GroupMe: http://groupme.org/GroupMe/

\(^3\) Shibboleth: http://shibboleth.internet2.edu/

\(^4\) OpenID: http://openid.net/
Considering dimensions of life-long learning tools
Christopher Douce
Institution of Educational Technology, Open University, Walton Hall, Milton Keynes, UK
c.douce@open.ac.uk

Life-long learning is a term that has different meanings. It can refer to the learning that occurs in relation to a particular career path, learning inside or outside the workplace, or informal learning that occurs as a part of a hobby or personal interest. Tools that support life-long learning should be malleable enough to effectively adapt to changes in learning mode, behavior and context to take into account changes in the personal circumstances and objectives of learners. This paper presents the beginning of a process to uncover some of the dimensions that can govern the design of adaptable, extensible and customisable life-long learning systems.

Keywords: Life-long learning, VLE, MLE, mobile learning, tools, accessibility.

1. Introduction

Life-long learning can mean different things to different people. This paper begins with a brief definition which is followed by a presentation of scenarios in which life-long learning may occur. The ‘types of learning’ section illustrates how learning activities may change over time. This is complemented by considering the different tools that could be used by learners. Particular focus is given to learners who are carrying out periods of self study. New themes, such as the notion of the Personal Learning Environment, and the role it may play in on-going developments are introduced and considered.

Aspin describes a number of different definitions of life-long learning [1]. Some learners may develop an identity which is tied to and bound-up with learning activities. Others may simply view life-long learning as educational activities that help with life management. Another view is that life-long learning is learning that occurs throughout life. Others may see life-long learning as a set of interrelated ideas that can be used to transform society, enabling its members to become learning resources for its constituents.

The use of information technology creates the potential to enable ‘learner peers’ to interact and communicate with each other, allowing opinions, materials and learning techniques and strategies to be shared. Learners may gain an opportunity choose and define their own objectives and competencies that suit their needs. In essence, information technology, particularly, networking technology (which represents a both hardware and software technologies) may enable learners to engage with and consume educational resources in new ways.

The precise nature of consumption (and also the production) of educational materials will, of course, vary substantially between learners. To further understand differences it is useful to consider the idea of the ‘learner profile’.

2. Learner Profiles

One way to begin to understand the requirements of technologies that could be used to support life-long learning is to build user profiles, a principle that is well known within the interaction design and usability communities [2]. Different types of learner needs can be seen through different learner profiles:

- Jim works within a call centre. He feels that he could make more of a difference within his local community where he is a part time youth worker, but is not sure how. He quite likes the organisation in which he works but he is unclear about what he would like to do in the future. He thinks he would like to do something different.

- Dave is employed in an IT department within a large company. He knows that he is good at supporting people and feels that he will make a good systems administrator one day. Although IT is a field that is always changing, he has decided to take a professional IT qualification to help him gain promotion and develop his knowledge of the area.

- Sue has an interest in local history. Now that she is working only part time, she is finding it possible to learn more about her local area and understand how it has changed over time. She isn’t doing this for
anyone other than herself. She has always lived in the area where she lives and regretted not doing anything like this before.

From these simple profiles we can begin to consider the nature of the learning activities and strategies that different individual may use.

3. Types of Learning
The objectives of each learner are very different. Jim’s objectives are not yet formed although he might be edging towards a decision about what to do in the future. Conversely, Dave’s objectives are clear. He may even want to complete his studies within a particular timeframe to minimise his costs and maximize his earning capacity. Sue, on the other hand, may have few of these concerns. Instead of her learning being directed by curriculum, it is self directed by either herself or by other people around her.

Life-long learning is sometimes referred to in conjunction with informal learning. Informal learning may be task-based learning where individuals may utilise rapid training resources with the objective of learning about a specific activity or task. Jim, our employee within a call centre, may utilise task-based learning objectives to remember how to use unfamiliar parts of the call-centre application that he has to use on a daily basis. Jim may also have a fixed length of time in which his learning activity may be able to take place. The learning objectives may be stable and a training department of his organisation may have created a fixed curriculum and developed custom e-learning material. His learning may also be carried out on an individual basis, rather than within a group.

Issues such as the solidity of the learning objectives, the extent of group working and the amount of time available for learning can broadly be considered to be dimensions or attributes of life-long learning. Another important dimension is the personal needs of learners. Learners who have decided to enroll on a formal programme of study after some time of not being engaged within education may need support that is different to learners who are well aware of the demands that may be placed upon them. Similarly, learners who have additional needs may also need support to ensure that they can fully participate in learning activities.

It should be recognised that any one of the learners that have been described earlier may become disadvantaged in terms of their ability to carry out or participate in learning at any time. As a result, technological support that they use to access learning materials or to gain inspiration or material from others should be made to be as accessible, usable and adaptable as possible. This leads us to consider the use of learning tools, systems and technologies and how they may be able to support individuals.

Let us again consider Jim. Jim may be a user of a web-mediated social network. As a result, he may have the ability to ask his friends, ‘what would you do?’ His friends might respond with a set of criteria that he could use to build a framework to help him to plan his future. This activity could occur face to face, or through communication tools such as instant messenger, for example. He may use the tools at his disposal to ask follow up questions.

Dave is in a different situation. He knows what he wants to do and as a result may use online discussion forums to share learning experiences with peers in other companies who may be following similar career trajectories.

Discussion forums that help others to make career decisions can be found for subjects such as taxation, accountancy and medicine as well as IT. Dave may ask questions such as which exam to do next, what are the most difficult areas to attend to, and what activities he might carry out to most effectively prepare for examinations. Dave may also be in a position where there are other people within his company also taking similar exams. He may ask them for advice, and even use some of the same material that they did.

Sue’s situation is very different. Unconstrained by time and curriculum her objectives are her own. Whilst she may use forums to share details of her project with others, she may use different tools such as mapping utilities to record information about the areas she has studied and diary or blogging tools to keep record information that she has gathered (she may even using her own ePortfolio, perhaps using a set of word processing files to gather the evidence of her research activities).

Each learner could, in essence, create their own personal learning environment, [3], [4], using resources found on the internet or tools found within the computing devices that they may have at their disposal. Their personal
learning environment could be their own laptop computer where each learner could store their files, learning histories and contacts to other people who share similar interests. Alternatively a web-based or peer-to-peer application could be used to share opinions and information with other learners [5].

Two interesting issues include how learners may make decisions regarding the tools that they use (and decide whether they may be useful), and how the tools can adapt to changes in learning activities. It is this issue of adaptability to which we turn to next.

4. Adaptability

Each learner may change their learning trajectory at any time. Jim may make a decision to leave the company in which he works and instead embark on a series of formal courses that would help him to reach his aim of providing help and support to his local community. Dave may decide that he does not want to become a systems administrator and instead wishes to focus on how the existing systems in his company could be modified to ensure that customers are presented with an effective and efficient user experience. Dave’s objectives may become unclear.

Sue, on the other hand, could choose to temporarily abandon her informal studies and instead select a more formal path. She may conclude that she needs a stronger understanding of what it means to ‘study history’ and also wish to learn more about some of the subjects that she has found through her informal research. She may now be looking forward to working with others.

Two areas of change can include the formality of the objectives and the amount of learner collaboration that may be required. These issues are underpinned by the need to support adaptability, accessibility and security.

It is an obvious statement that life-long learning tools should invariably place the learner at their centre. Users must be able to manage their identity in such a way that they have complete control over what is presented to others and be able to selectively choose what resources they may consume and when. These issues are particularly pertinent due to the emergence and deployment of software that is increasingly ‘social’.

A further point relates to the ways in which adaptable software might be used. A personal learning environment may be used to consume web services to secure access to alternative forms of learning materials (an issue that a related project called EU4ALL is exploring, [6]) or present RSS feeds describing new subject topics, news and courses.

Creating consistent forms of interaction to enable different types and categories of learning tool to work together remains a substantial challenge. Furthermore it is necessary to consider how knowledge and usage of tools could be shared between different groups of learners.

5. Summary

Some authors have written about the triadic nature of life-long learning, [7], meaning it is often spoken about in three different ways. Firstly, with regards to economic progress and development (Dave’s desire to progress in the company where he works), secondly in terms of personal development and fulfillment (Sue’s desire to learn more about local history just for the sake of it), and finally, as a way to create and instill inclusiveness and democratic understanding and activity (reflected in Jim’s desire to become more involved with his local community).

Learners learn for different motivations and any personal learning system or life-long learning system should always address the need for adaptability and have the potential to change.

The definition of a personal learning environment is not one that is currently fixed. It can be used to refer to a laptop or personal computer (in some cases) or a collection of related on-line services that can be accessed through an end user application or a web-client. When we consider the need to address flexibility we also need to consider how information about tools (and how to use them) can be shared between different groups of learners. Learning tools have the potential to help users to explore future areas of study, foster the development of study skills and instill an awareness of different learning trajectories that may be available.

There are a number of dimensions of life-long learning tools. These include individual user preferences in terms of the form of material that is needed to enable study (an accessibility issue), the clarity and formality of learning objectives, the extent to which collaboration is needed, as well as important practical issues such as identity management and security.
Further dimensions are likely to exist and made explicit as new ways of connecting learners continue to be developed.

Creating a life-long learning system, suitable for all learners, which comprises of malleable learning tools is a challenging and potentially impossible task, but one that should be explored. This paper has demonstrated the use of learner profiles and illustrated how learners can change over time.

References
Development and Use of the Hybrid Learning Model. Bringing Learning and Teaching Together.

Alan Masson, Áine MacNeill, Colette Murphy and Vilinda Ross
University of Ulster, Newtownabbey, Co Antrim, BT37 0QB, United Kingdom
Email addresses: aj.masson@ulster.ac.uk, ab.macneill@ulster.ac.uk, c.murphy1@ulster.ac.uk, v.ross@ulster.ac.uk

Abstract
The Hybrid Learning Model is an interactional model that encapsulates teaching and learning in a plain English format and has the learner perspective at its core. This paper describes the Model and its effectiveness in addressing the challenges associated with the capturing and describing of teaching and learning practices.

This paper reports on the effectiveness of this model in articulating, reflecting on, designing, evaluating and sharing academic practice, drawing on studies involving over 50 academic practitioners and 200 students. It also describes the Model's suitability in influencing learner centred practice, enhancing the learning and teaching experience and assisting students adapt to new learning activities.

Finally, the potential to develop the Model to provide teachers and learners with a simple, standards based framework to traverse the continuum of learning design is discussed.

Keywords: Learning Design, Teaching, Learning, Reflective Practice

1. Introduction
"Change is endemic in the education sector. The pressures for change come from all sides: globalisation, government initiatives, doing more with less, improving the quality of student learning and the learning experience, and the pace of change is ever increasing. Living with change and managing change is an essential skill for all." [1]

The “Centre for Institutional E-Learning Services” (CIES) [2] is part of the Centres of Excellence in Teaching and Learning (CETL) initiative across the UK and Northern Ireland, and is based at the University of Ulster. It is an institutionally based Centre of Excellence and the core activities take place internally within the institution. The main aim of this CETL is to promote, facilitate and reward the adoption of a ‘learner centred’ reflective practice approach to the development of teaching and learning, in particular with respect to the use of e-learning technologies.

The raising awareness of both the learner context and a greater understanding of their roles and expectations is an essential priority for the project given the changing social, technological and educational context within a society seeking to embrace social inclusion and lifelong learning agendas.

One of the project’s initial aims was to seek to develop a reference model that could be used to promote reflection, evaluation and dissemination of effective teaching and learning practices to teachers and learners.

This paper reports the development of a Hybrid Learning Model [3] to allow practitioners to describe teaching and learning practices, which are traditionally challenging to articulate in a precise and disseminable manner [4][5]. The paper will provide an overview of the Model and will discuss a number of teacher and learner perspective use cases.

2. Overview of the Hybrid Learning Model (HLM)
The Hybrid Learning Model described in this paper is based around straightforward concepts and uses simple language to allow practitioners to easily articulate and share teaching and learning practice in a generic and reusable format. It is based on and adapts the University of Liège, LabSet project’s ‘8 Learning Events Model’ (8LEM) [6][7] and is enriched with a vocabulary of generic ‘learning activity’ verbs derived and adapted from Bennett [8], University of Wollongong.
Each of the eight learning events is expressed in iconographic terms that depict the basic teacher - learner interaction and each event is complemented by a closed list of associated verbs for typical teacher and learner activities that provide a further simple, yet powerful aid to articulating practice.

The Model is supported by a set of prompt cards that provide a tactile environment to aid reflection and design. To facilitate the modelling process, these simple two-sided flash cards each display the learning event on one side and associated relevant teacher / learner verbs on the other. A number of visual aids were incorporated into these flash cards to provide reinforcement of the interaction type and the distinct learner and teacher roles.

![Figure 1: Example of flash card (front)](image1)

![Figure 2: Example of flash card (back)](image2)

The resulting enriched 8LEM sequences, depicting learning events and teacher and learner specific verbs are further annotated with appropriate contextual information including objectives, resources, environments and other relevant prompts. This provides a rich reference framework that is concise and structured and has the learner perspective at its core.

### 3. The Model in Action

In the initial development stages of the Model, the project team used a facilitation approach carried out in an informal setting. Following a brief overview to the modelling process and the Hybrid Learning Model, practitioners were provided with a set of flash cards. Using a lesson plan as a reference point, the teacher selected appropriate learning events to describe their practice. Once an overall sequence of learning events had been chosen, the practitioner then turned over the flash cards one by one and selected the verbs that most closely described both their own activities and that of their learners within each individual learning event.

When more than one verb per role was selected, the practitioner was encouraged to consider if these activities formed an asynchronous sequence or an overall synchronous interaction. This additional annotation provided a useful granular interaction sequence within the learning event. At the end of this process, the facilitator transcribes the model onto a template form, along with relevant contextual information, for review and reflection.

The use of the cards in an informal environment allows practitioners to choose specific learning events and verbs in a relaxed manner, usually resulting in further experimentation and re-consideration of both the sequence of events and their choice of verbs to describe learner and teacher roles. This indicates the value of the physical cue cards in promoting reflection and ongoing questioning when considering and articulating teaching practice.

Practitioners were able to personalise the process and use of the cards to best describe their practice in terms of actual processes, interactions and in a clear way where expectations are apparent. The cards, as a physical cue perhaps promote more ownership of the modelling process and allow opportunities for deeper reflection.
4. Use Cases

The Model has provided a common design language for face to face and online activities. The simplicity and universality of the concepts and language used within the Model has resulted in a number of added value use cases being identified. Initial development and evaluation of the Model with practitioners identified a number of potential uses of the Model. These include:

1. Raising awareness of teaching and learning processes and in particular the learner perspective;
2. Reflecting on, evaluating and reviewing current practice;
3. Planning and designing course materials / learning activities;
4. Providing a reference framework to assist in course administration functions e.g. course validations and peer observation.

Focus groups with students allowed a comparison of student and teacher developed models of the same learning activity to be considered. The results from these sessions confirmed that learners found the Model easy to use and that their experiences were articulated in a consistent manner.

Student feedback from this activity also suggested that the Model could provide learners with a simple and clear framework to assist their learning, in particular in group work and independent learning situations. This feedback initiated an evaluation of a further use case:

5. Assisting students to adapt to new learning situations by clarifying expectations and processes.

This latter study involved the compilation of teacher developed models, using the HLM, which were then used to support students participating in defined activities e.g. seminars, case studies, group work and practicals.

5. Practitioner evaluation of the Hybrid Learning Model

The Model and its use in the above scenarios has been formally evaluated by teaching staff, teaching support staff and staff developers using a number of complementary research tools and measures including interviews, closed and open response questions and focus groups.

Initial evaluation of the HLM and its supporting flash cards with practitioners identified the benefits outlined in Table 1.

Table 1: Percentage user responses (from practitioner perspective) relating to aspects of the learners’ role (n=51)

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The model provides an accurate description of the teaching / learning process</td>
<td>79%</td>
</tr>
<tr>
<td>The use of the model provides me with a greater awareness and understanding of the learners’ role</td>
<td>87%</td>
</tr>
<tr>
<td>Use of the model has provided me with a greater awareness of the nature of the interaction between the teacher and the learner</td>
<td>80%</td>
</tr>
</tbody>
</table>

These findings were strongly supported by open responses including:

- “Encouraged me to think about it from the learner’s perspective rather than just focusing on the teacher”;
- “It has shown me learning events/verbs which maybe I am not using as much as I could/should be. It's made me think more of varying activities in the lab”;
- “Looking at the learner perspective with fresh eyes”;
- “Made me think of just how many different aspects there are to the learner’s role”;
- “I tend to underestimate the learner’s efforts”;
- “Made me think about balance of expectations vs balance of activities”.

6. Learner evaluation of the Hybrid Learning Model

Tutor developed models to describe specific learning activities were presented to learners as walkthrough animations and summary tables.

Evaluation of this use of the HLM to assist learners to adapt to new learning situations indicated that the structure and simplicity of the provided models was positively received by learners. Indicative feedback from this evaluation is presented in Table 2.
Table 2: Sample scenario feedback
(n=50: Year 1 BSc Marketing students undertaking a portfolio based assessment)

<table>
<thead>
<tr>
<th>Feedback</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>After seeing the modelled activity I did not need to contact my lecturer to find out more about compiling my portfolio</td>
<td>82%</td>
</tr>
<tr>
<td>I am using the modelled activity in preparing my portfolio</td>
<td>78%</td>
</tr>
<tr>
<td>The modelled activity helped me to adapt to completing my portfolio</td>
<td>92%</td>
</tr>
</tbody>
</table>

Subjective feedback from the above students indicated that the introduction of the Model provided them with a greater appreciation of the learning process, increased confidence in how they should “perform” the activity and a clear reference framework for them to refer to. Comments on how students used these modelled activities included:

- “To help me bring everything together and know what is expected from me”;
- “Something like this would be a positive help... especially the terminology and being able to focus your learning differently”;
- “It makes you structure your learning and expectations”;
- “I shall check my work against this model and tick off each section as I complete it”;
- “Mainly as a checklist to see if the main points have been illustrated in my work”;
- “The model helps to keep me in track with what is expected of me when preparing the portfolio”;
- “Taking all points into consideration and using the advice to achieve the best marks”.

Feedback from teaching staff involved in the above task supported these comments:

- “They (the learners) now demonstrate a greater understanding of what is expected from them”;
- “The Model has been an invaluable tool in guiding the student to a better understanding of what is required of them for assessment purposes”.

7. Conclusions

The strength of the Hybrid Learning Model is its transparency, use of plain English and its potential for breaking down complex learning activities into a generic, reusable format so that good practice can be disseminated, reused and evaluated easily. The method has added value in that it promotes self and peer reflection on teaching and learning practice and makes explicit both the learner and teacher role within those processes. The Model is simple to use and is universally understandable and provides great insight into the actual processes in teaching and learning, as well as considering the human aspect and social interactions involved.

The use of the Hybrid Learning Model offers the opportunity for academics to reflect on their current practice and can assist in responding to changing learner contexts. The Model can also be utilised in a learning design context as a common design language that is suitable for both practitioners and learners. It has also proved valuable in providing modelled activities that can be used to help students to adapt to new learning situations and to clarify expectations that teachers have of them.

Evaluations to date indicate that the HLM can act as an aid to encourage, develop and support independent learning skills among learners encountering learning activities for the first time.

The Hybrid Learning Model has been adopted by the University of Ulster and has been embedded within staff development courses including the Staff Induction programmes for teaching and support staff and Postgraduate research students and is also included in a number teaching and learning related courses.

8. Future developments

The development of an electronic version of the HLM modelling process will provide a more automated, independent method of user reflection and articulation and an automated generation of relevant outputs. The design of such a user interface is a creative challenge however, as some of the key benefits of the flash cards relate to the inherent flexibility of use and implicit self reflection that the informal and hands-on nature of the cards promote.

An added benefit of an on-line data capture process will be the simple incorporation of rich profile information such as Laurillard’s Media Types [9] to resources used within the Model.
A review process of the pilot implementations of the HLM in the use cases described above will allow a formal data model to be articulated. The formalisation of the underlying data schemas will provide the necessary foundation for the Model to act as a transition tool across the Learning Design continuum. This approach will permit the HLM to formally interact with other Learning Design tools and schemas to, for example:

- Import an IMS Learning Design artefact [10] and articulate it with a social context to assist teachers and learners in its use;
- Allow a practitioner to formalise and structure their practice in readiness to develop a defined learning resource within a Learning Design tool such as LAMS [11].

Finally, the exploration of additional use cases of the HLM will be investigated. The potential for the Model to be used as a research tool to capture both learner and teacher perspectives of the learning process, in particular is an opportunity to exploit the inherent ease of use and conversational nature of the Model reported by both learners and teachers.

9. References

Towards a TENCePortefolio ePortfolio

Adriana J. Berlanga, Peter B. Sloep, Francis Brouns, Marlies Bitter, Rob Koper
Open Universiteit Nederland
PO Box 2960
6401 DL Heerlen, The Netherlands
adriana.berlanga@ou.nl, peter.sloep@ou.nl, francis.brouns@ou.nl, marlies.bitter@ou.nl, rob.koper@ou.nl

Abstract
This article argues that the TENC ePortfolio definition should integrate rhetorical, pedagogical, social, and technical perspectives. The rhetorical perspective is needed to show the learner’s competences, achievements and history; the pedagogical perspective aims at supporting learner’s self-reflection, through the definition of competences mastered, review and creation of (new) CDPs, creation of showcases, and assessment of competences; the social perspective aims at fostering interaction and social help support, and the technical perspective objective is to support the other three perspectives. Guiding principles for the design of the TENC ePortfolio are provided, and the aforementioned perspectives detailed.

Keywords: Learning Networks, ePortfolio, social interactions, personal profile

1. Introduction

ePortfolios are commonly conceptualized as collections of learning evidences. Learners define these evidences through a self-reflection process through which they attribute their competences to learning products or outcomes, and reflect on how they acquired such competences. From the pedagogical point of view, this process helps learners better to understand themselves (knowledge-self) and become self-directed learners. Learners can use ePortfolios for multiple purposes such as: learning, professional development, assessment, job applications and promotions [1], showcasing, developing personal plans, accreditation, collaborative learning [2], and receiving feedback. Likewise, ePortfolios can be used for tracking learners’ development within a program and monitoring and evaluating their performance [3].

Not only because of their versatility, but also because they recognise learning as a continuing process where individuals are
responsible for defining and organizing their own learning [4]. ePortfolios for lifelong learning have been claimed as the “ideal state” of ePortfolio usage [5]. In areas such as teacher education and medical education, in which professionals are used to evidence their competences, show their work, and update their competences constantly, ePortfolios have been extensively studied and implemented. They are perceived as instruments that enhance learning [6] and support the development of competences [7].

Nevertheless, generally speaking, teachers and learners seldom consider ePortfolios for lifelong learning [8]. What is more, literature on the topic reports only a few recent studies. A literature search in the Education Resources Information Center (ERIC) and the Web of Science databases returned, respectively, 7 and 2 entries to a query that looked for journal articles published after 2000, and contained the terms “*portfolio*” and “lifelong learning”. Other terms instead of “lifelong learning”, such as “adult education”, “tertiary education”, and “further education”, were tried, but the results were practically the same.

In addition, ePortfolio implementations for lifelong learning represent, almost exclusively, their showcase purpose (see, for instance, http://www.efoliominnesota.com). From the technological point of view, at the same time, ePortfolio interoperability and exchangeability are perceived as an important research topic (see, for instance http://www.nottingham.ac.uk/epreferencemodel).

So, in spite of their promises, which has prompted much research into their technological aspects, ePortfolios are hardly used in lifelong learning and, if so, only in a limited sense. We surmise that a lack of attention for its integrative powers, may well lie at the root of this.

Indeed, Cambridge [9] suggests ePortfolios should be integrative. They should bring together a rhetorical, a pedagogical and a technical perspective:

“Rhetorically, they provide an integrated representation of what a person knows, believes, values, and can accomplish. Pedagogically, they integrate diverse learning experiences and sources of evidence. Technically, supporting their development and use requires integrating numerous systems and applications” (pp. 235).

We hold that this idea should even be extended further by including the social interaction perspective. Thus ePortfolios acquire the potential to foster interaction [10], encourage participation and motivation [11], develop trust [12], and
promote visibility [13]. In our view, ePortfolios should be also seen as instruments that foster interaction and knowledge sharing.

To that end, ePortfolios should fulfill three conditions [14]: continuity, recognisability and history. Continuity means ensuring a permanent relation between participants that have already been in contact; recognisability means helping participants to identify each other by providing information about others in the community; and history means showing participants’ past behavior. The visualization of the participant’s profile and her contributions to the community is also important. It raises participant’s awareness of her own actions and those of others and, at the same time, demonstrates the consequences of their actions [15].

2. The TENC ePortfolio service

The TENCompetence software road map has already described that the project will increasingly focus on the ePortfolio perspective, which should include identity and personal profile. It has even been said that the PCM itself is an ePortfolio system because it has information on the participants, such as current competences, competence profiles mastered, learning evidences, etc., that could be used to create an ePortfolio for each member of the Learning Network. However, this is not evident for the learner or for the design or structure of the PCM.

As mentioned in [16], we believe that each learner in a Learning Network needs a desktop feature (e.g., a “MyDesktop”) that helps her to control her activities throughout the communities in which she is involved. This activity includes, for instance, her learning actions, communities, contacts, personal development plans, etc. Using this feature, participants will actually perceive the PCM as their personal point of development before they are aware of the rest of the Learning Network. It will be perceived as the starting point that connects the participant with the rest of the members of the community. The TENC ePortfolio objective then is two-fold: on the one hand, to allow participants to control their own activity, performance and social interaction, and, on the other hand, to provide information about them to the other members of the community, in such a way that the continuity, recognisability and history conditions are satisfied.

Following recommendations from [2, 17], we believe that the TENC ePortfolio should not be disassociated from the didactic concept of a flexible, personalized, and social-interaction education instrument based on competence development; it
should be owned by the learner; it should use the technology the learner is already using, instead of replace it; and it should explore the possibilities of social web applications to link formal and informal learning.

This idea also considers learning evidences as any outcome or product that the learner wants to use to indicate a competence. This is to say, evidences located both inside and outside the PCM should be considered. In the PCM these evidences include, for instance, competence development plans (CDPs), units of learning, learning actions, resources, participation in learning networks and ad hoc transient communities [18]. Outside the PCM they include, for instance, links to learner’s school records, activity in (social) web applications, links to external web pages or to resources, and so on.

Furthermore, the TENC ePortfolio should be designed from an integrative notion, which, naturally, will unite the rhetorical, pedagogical, social interaction, and technical perspectives described before.

The rhetorical perspective is needed to provide a visual overview of the learner’s achievements, past behavior (history), current position in the Learning Network, and communities joined. This should include showing a learner’s:

- Competences and competence profiles mastered, linked to a list of their learning evidences.
- CDP, units of learning, learning actions and resources followed, as well as current position in the Learning Network. This information can be provided by the positioning service [19], which is currently under development in WP7.
- Past and current communities and ad hoc transient communities [10, 20] the learner has been involved in.

The pedagogical perspective is needed to support the learning process through self-reflection and assessment. Self-reflection requires collecting learning evidences, attributing them to competences, and writing reflections about the competences acquired. To this end, the pedagogical perspective should support different tasks:

- Definition/upgrade of competences mastered. If this has not been done automatically by the PCM, the learner needs to specify the competences he already has (by attributing them evidences), but also those that he wants to develop further.
- Review of CDP followed, the learner adds and removes competences acquired, writes a reflection about the learning process, and rates the CDP. This will allow her to understand her own learning development, to plan further the competences she wants to acquire [7], and to evaluate the CDP.
• Creation of new CDPs. If the learner has followed informal learning paths, discovering different paths to achieve a competence, he needs to reflect and describe what he did to acquire a competence by creating a new CDP. Likewise, if the learner has followed only certain parts of an existing CDP, this new path has to be defined as a new CDP. In both cases, the CDP should be described, preferably in line with an interoperable learning path specification [21].

• Creation of showcases, for different audiences and purposes. Showcases should be based on competences mastered. Learners need to be able to export their showcases into different output formats, such as XML, .pdf, IMS LIP, etc.

• Assessment of competences that could combine external assessment, mentoring, peer and self-assessment.

The social interaction perspective is needed to foster social interaction, to connect the learner with all the communities and ad hoc transient communities she belongs to. This connection can help learners to receive feedback from peers and tutors and collaborate with them, two functions that learners and teachers appreciate much [8]. This perspective should facilitate:

• Creation of the personal profiles. Different profiles for different audiences should be possible. For instance, a personal profile to share with friends is most likely to be different to one for potential employers. What information the profile should include is still in progress. Up to now background information on personal identity is claimed to be important for effective knowledge communication and trust (Brouns et al., 2007). However, each learner should have the option to choose what information each personal profile should display.

• Social help support, by recommending peers to collaborate with, in terms of peer-support or peer-feedback. This is carried out in the context of WP8. See, for instance [20, 22].

• Get information about the past and current communities and ad hoc transient communities in which the learner has participated, including information about participants already contacted, and their past behavior. This will ensure compliance with the continuity and history conditions mentioned earlier in this paper.

• Creation and maintenance of contacts. To create a contact a learner can select or invite members of the Learning Network to be part of her contacts list. Contacts can include peers, teachers, tutors, institutions or even true friends.

Finally, the technological perspective is needed to support the other three perspectives. This perspective should:

• Automatically create an historical record of the actions of each learner; information that should help different TENC services to run properly (e.g.,
navigation, positioning, peer-support, and others).

- Integrate the different services (e.g. positioning, social help support, creation of showcases, etc.), defined in the other three integrative characteristics.

- Support exchangeability and interoperability of the TENC ePortfolio.

- Support privacy issues such as public and private ePortfolio views and configuration of information for public/private/reserved to specific audiences.

3. Conclusions and Future Work

In this article we collected several arguments, if only succinctly, that support the importance of ePortfolios for lifelong learning and their relevance for TENCompetence. Indeed, we argued in favor of a TENC ePortfolio designed and developed to follow an integrative approach. It should be noticed that such an approach is closely related to the one suggested by [8], which they claim to benefits learning most effectively.

The interface design of the TENC ePortfolio should present the integrative perspective by showing in a separate tab each one of the rhetorical, pedagogical and social interaction perspectives. Also, there are additional features that will be highly desirable to consider, such as: a) supporting the integration of different Web 2.0 technologies, b) integrating the software the learner already uses, c) customising of the interface, so that learners can include the services they want, and choosing different look and feel templates.

The next steps are to define the TENC ePortfolio usage profile and the information the TENC services will need from the TENC ePortfolio and vice versa; it will also be necessary to detail the information the ePortfolio needs from the services.

Acknowledgement

The present work was carried out as part of the TENCompetence project, which is (partly) funded by the European Commission (IST-2004-02787) (http://www.tencompetence.org).

References


Abstract: This paper reviews the architectural design of an e-learning network (Nonprofit e-Learning Network) designed specifically for the broad Voluntary and Community Sector (VCS). The project is aimed at the majority of the VCS who, because of cost or time concerns, or for other reasons, make little or no use of traditional formal approaches to learning or even access short training courses. The central educational philosophy of the network is based on informal learning, but as the design proceeded it became clear that both formal and semi-formal learning would also be needed. This led to the development of an architecture based around three “zones” corresponding to informal, semi-formal and formal learning.

Keywords: Communities of practice; informal learning; charity sector; lifelong learning; learning design; learning architecture

1. Introduction

The UK charity sector has a significant and persistent “learning deficit” – less than a third of the spending per employee on staff training and development compared to public and private sector organisations. Yet at the same time the government is expecting the sector to take an increasing responsibility for the operation of non-profit activity, e.g. in social care. This paper reports on a project which was initiated by a consortium in 2004/5, with a view to providing a large scale entirely electronic-based learning network, aimed to reduce the learning deficit. The project funding was finalized in 2007 after the development and testing of a prototype, and the aim in this paper is to highlight key dimensions of the architectural design of the project, which has a particular emphasis on the management development needs of “hard-to-reach” groups.

The learning deficit is particularly noticeable in the managerial area. In professional areas e.g. of social care, there are professional qualifications and compulsory professional development. There are typically no or few such requirements for those in management positions, whether paid full time staff or volunteers.

The consortium examined the prospects for growing conventional formal learning, but found that regardless of whether it was face to face or distance learning, there was very unlikely to be significantly increased take-up of formal learning: for several reasons:

- Cost, both financial and time
- Commitment, particularly of time, over a sustained period to complete a qualification
- The granularity of the need may be small e.g. the answer to a quick question does not necessitate a three year, three month or even three hour formal learning programme.
- Lack of appeal of formal learning e.g. to hard-to-reach groups

2. Learning Architecture

It is well understood that a vast
amount of informal learning takes place daily, e.g. via web searches and on-line resources such as wikipedia [1]. The problem there is with the sheer quantity of material, its often geographically limited value (e.g. quite different legislative and cultural frameworks in the USA and UK) and also its variable quality. It was clear, nevertheless, that more efficient and effective use of informal learning resources including critical thinking about the material, would aid the everyday learning of those working in the third sector.

If formal learning and informal learning occupy two ends of a spectrum, then there is a middle ground potentially available. We have chosen to name this “semi-formal learning”, though in truth it is closer to informal learning than formal, since it does not involve classes, cohorts, qualifications, curriculum or assessments. It has some degree of structuring, though by and large not of a top-down hierarchical nature. It includes a wide variety of methods, but it is particularly well suited to the use of the internet, and even more specifically, to the use of Web 2.0 tools and technologies. What it lacks in terms of top-down structure, it makes up for by the nature and energy of its bottom-up communities. Self-organising communities of practice are one of the key vehicles of semi-formal learning. They include those with expertise (they might not be comfortable with the term “experts”), and they include those who are novices.

Communities of practice predate the internet. This is the area of the club and society, of the association and co-operative. With the growth of electronic networks, such as the Well and Usenet, came the first online communities of practice. With web 1.0 and now web 2.0 these have grown exponentially, to the point in fact where it is difficult if not impossible to track down all the key relevant communities of practice.

Communities are glued together by any number of online collaborative tools, including discussion boards, blogs, wikis, instant messaging, online conferencing, webcasts, webinars, social networking applications etc. They carry overheads, above all the time of volunteers needed for essential tasks such as setting up the community and then moderating it and excluding undesirable external material, as well as that internally generated which breaches the etiquette of the community. Some virtual communities develop at least a fleeting physical presence, such as a meeting annually, while others link up with some cognate physical event, such as a conference well-known in the community. There may also be special online events, such as large-scale jams.

As with informal learning, most semi-formal learning will proceed without any top-down influence whatsoever, and indeed the volunteer spirit of the community might well be harmed as a result of top-down intervention. But the major disadvantage of the bottom-up community is that it will only cover what its current members want it to cover, and which its current members are able to cover.

It is noticeable that wikipedia and its various offshoots such as wikiversity have been very successful in creating valuable encyclopedia entries on sport and popular music. They have had nothing like the same success in the area of management.

One potentially valuable route to filling the gap has been the development of Open Educational Resources (OER) e.g. from MIT (largely course handbooks) and the UK Open University (largely paper-based course units published in html).

Informal learning fundamentally requires a bottom up, non-hierarchical approach to learning [2]. So is it possible, or even desirable, to apply methods which have evolved in a formal learning context to the promotion of informal learning? Or should informal learning be promoted and shaped by an entirely different set of values than formal learning? According to [3] “learners who are not engaged with educational institutions are not likely to be attracted by institutional systems”

3. Design: Three Zones

The result of the above review led to the design of the NPeLN around three “Zones”.

Zone 1- “Information” relates to wholly informal learning, allowing users to learn to their own schedule and time. This zone is fully open, requiring no registration. The Zone provides access to a substantial range of generic materials accessible through a logical structure which makes it easy for users to find materials in key subject areas (e.g. fundraising, strategy, managing volunteers etc). Materials are mainly via electronic links to other free services and providers. In this Zone, users thus gain access to materials through the portal itself, but also access
other organisations web sites’ materials. A fundamental aspect of the NPeLN in this area is providing resources to improve the searching and reviewing skills of learners.

Zone 2 – “Problem solving” requires users to register (free) and learning is semi-formal (i.e. there will be some organisation of events and interactions). Users access material in a range of ways including through 20-30 Special Interest Groups (SIGs), which are primarily subject-led (e.g. fund-raising, governance, strategy, project management etc). SIG leaders stimulates users to join SIGs and be active in generating, modifying and commenting on materials produced and would promote the work of the SIG. SIGs typically generate newsletters, noticeboards, knowledge banks, podcasts, surveys and organise e-events and webinars. In these ways, users of Zone 2 will be ‘active in their own learning’. The exact boundary between Zone 1 and 2 evolves in the light of usership/practice

Zone 3 – “Study” provides formal learning organised through academic courses with short and long courses and other education and training providers, combining conventional learning with e-learning through e-teaching, coaching and mentoring. Generally, courses are charged and may be designed for specific VCS organisations, both frontline and infrastructure.

4 Technical Architecture

There have been a number of key areas in relation to technology which have led to the final shaping of the technical architecture.

The project was originally conceived in 2004/5, before the term Web 2.0 had been identified. It will not be completed until the summer of 2011, the technologies of which cannot be accurately predicted. So a crucial dimension of the project architecture is between flexibility to allow for unknown future developments, and relatively stable “core” components which will vary little if at all over the project lifetime.

Key decisions were needed on the balance between open source and proprietary technology. The core values and core proposal meant there would be a dominance of open source technology used, not least because the sector is already an active user of open source, including volunteering, being very well aligned with that of the sector as a whole. However it was recognised that at the margin it was necessary, and possibly even desirable, to use proprietary technology for either pragmatic reasons (already available) or in because of the importance of reliability.

The “Make or Buy” decision has been a perennial one through the history of IT. These days the “buy” part may involve tens of pounds rather than tens of thousands, e.g. for a license to use web-based applications. The “make” part also could involve initiating a plug-in or module already present in an open source menu.

Another key decision concerned scalability. The project necessarily would start very small, but over the project life would grow to over ten thousand users.

The project would also need to satisfy both very technology literate early adopters, as well as those who might initially be wholly unfamiliar with technology. While the former group was important in the initial perception of the NPeLN, it was the latter who were the ultimate core group, and therefore it was vital that the user interface and navigation fully met the needs and constraints of the latter group.

The network had to be initiated in a top-down way to get it started, but the aim from the very start was to ensure that it was as configurable and adaptable as possible by some or all of the participants themselves. The consortium had noted another learning network where it was not possible for example, for participants themselves to initiate a new thread in a discussion board, this only being possible by a moderator.

Despite the above design decisions appearing to be largely technical in nature, it emerged that almost all of them had significant impacts on the wider perception of the project, and therefore the decisions on them were taken at the highest strategic level in the project, also taking into account impacts and risks in relation to project learning outcomes.

5. Conclusion

Although there was initial consideration of creating a wholly informal learning network, it eventually proved necessary to think in terms of three zones of learning, informal, semi-formal and formal. The area requiring the most
significant relates to the semi-formal learning zone, based primarily on communities of practice. The task in the informal zone primarily relates to improving learners skills in accessing and interpreting generic materials. There have also been a number of key technology architecture decisions.

References


Abstract
The vast majority of knowledge management initiatives fail because they do not take sufficiently into account the emotional, psychological and social needs of individuals. Only if users see real value for themselves will they actively use and contribute their own knowledge to the system, and engage with other users. Connection dynamics can make this easier, and even enjoyable, by connecting people and bringing them closer through shared experiences such as playing a game together. A higher connectedness of people to other people, and to relevant knowledge assets, will motivate them to participate more actively and increase system usage. In this paper, we describe the design of TENTube, a video-based connection tool we are developing to support competence development. TENTube integrates rich profiling and network visualization and navigation with agent-enhanced game-like connection dynamics.

Keywords: competence development, connection dynamics, connection games, intelligent social agents, knowledge management, learning networks, network visualization, virtual communities.

1. Introduction
Knowledge exchange is particularly valuable in situations where feedback and advice from others is key. One such context is competence development, where people require access to knowledge and people to help them reflect on their current competences, learn which functions or jobs are within their reach, and explore the possibility of learning new skills or working in a new field. However, the vast majority of knowledge management networks and communities fail to thrive because they do not take sufficiently into account the emotional, psychological and social needs of individuals. Even if the system’s repository contains many knowledge assets and has a large user community, it is difficult to connect people to relevant knowledge assets. This important issue was highlighted recently in a 2007 survey of IT professionals [1]. When asked what would make on-line IT communities more beneficial, the most frequent response was better search capabilities. Other areas for improvement included full-time moderators, whose role includes connecting people to content or people to people, and resident subject matter experts.

In order to address this issue, new features, such as games, agents and network visualization and navigation tools, which take into consideration the social nature of knowledge exchange, need to be embedded along with the traditional knowledge management functionalities normally found in such systems [2][3][4][5]. Features supporting the social exchanges that occur between community members, particularly the ability to generate ‘connections’ between people, are needed to give users more opportunities to engage in informal knowledge exchange with others, and stimulate them to actively participate in sharing and building on each others’ knowledge and experience [6][7].

In order to increase the “connectedness” within the TENCompetence system, we are developing a video-based connection tool which supports competence development by integrating rich profiling and network visualization and navigation with agent-enhanced game-like connection dynamics. TENTube consists of three coupled environments: a channel, a network visualization and navigation tool, and a game. In addition, TENTube contains embedded
connection agents which gather information about a user’s profile and system use, select the most appropriate videos and users to connect with, and stimulate users to watch and submit videos.

2. The Value of “Connectedness”

The concept and value of “connectedness” has been explored in many diverse disciplines such as knowledge management, psychology, sociology, social network analysis, organizational learning and strategy. Connecting people allows them to fulfill their needs for being, knowing, building and ensuring. First and foremost, contact with other people is a basic human need. Our need to belong is only outclassed by our physiological needs and our need for safety [8]. In addition, according to the sociological concepts of the looking-glass self and the mind as the product of social interaction, our identity is confirmed in the eyes of others [9][10]. We need other people to affirm that we exist. When we are ignored our sense of self and presence fades.

Beyond the need for being, a second reason individuals connect with other people is because they need access to knowledge. Recent research has shown that people prefer to obtain information from people rather than documents [11][12][13]. Building professional or personal projects is a third reason that people need connections. Increased “connectedness” helps generate ideas, especially from connections with creative people and people in other disciplines [13][14]. It also appears that a fourth reason people need to increase their connectedness is to ensure their future. As a job for life is no longer the norm, many people feel increasingly insecure about their future. As we often hear that most new jobs come through contacts, we seek to increase our number of professional connections as insurance against unemployment.

Connecting people increases the number of their social ties which increases their social capital. Social ties can help one discover opportunities, sharpen one’s thinking, keep in touch with what is happening, give emotional support, and provide links to new people. However, there is a limit to the number of people with whom we can reasonably connect. Research suggests that we can only have genuine social relationships with 150 people [15]. Social networks require time to build and maintain. In addition, if we let a connection languish or die, it is often harder to recreate then it was to create in the first place.

Social ties are commonly classified into two main groups: strong ties and weak ties [16]. Strong ties are found between friends, while weak ties are found between acquaintances. While strong ties bring many advantages such as emotional support; ties that are too strong can cause relational network inertia, i.e. the ease of collaborating with those you already know well can actually prevent you from seeking out new ties. This can have an impact on new competence development, learning and adapting to new challenges [17].

Weak ties take less time to maintain so one can have more of them. Weak ties are good sources of useful non-complex information [18]. Weak ties can help people find a new job, develop new competences, encourage learners to adapt to new challenges, and develop their cognitive and social skills. Thus helping people connect with relevant others and develop more weak ties is one way of adding value to their online community and learning network experience.
3. TENTube design

In order to increase “connectedness” within the TENCompetence system, we are developing a video-based connection tool which supports competence development. TENTube integrates rich profiling and consists of three coupled environments: a channel, a network visualization and navigation tool, and a game, as well as embedded connection agents.

3.1 Channel

On the TENTube Channel users can very easily view, search, comment, tag, rate and submit videos in a similar way to YouTube. The key specificities of the TENTube Channel are:

- The environment is “closed” (i.e. not public).
- Users are identified when entering, have a profile, and their activities are recorded in a log file.
- Videos can be either imported from other sources, such as YouTube or produced and submitted by the users.
- Videos in the TENTube Channel belong to one of these three categories:

  **Competence Development Awareness Videos** - these videos feature presentations related to competence development in general; for example, “The need for intercultural media competence” or “Teachers can change the world”.

  **Competence Development Opportunity Videos** - these videos feature competence development opportunities; for example, educational institutions, courses, or books. “How to” videos also fit into this category.

  **Competence Development Expert Videos** - these videos feature individuals presenting themselves as experts in some competence domain. These videos can be seen as extension and complement to the “traditional” user profiles. Video resumes can also fit into this category.

In order to avoid cold start up problems with the Channel and illustrate the three categories, we have identified, uploaded and identified competences/tagged an initial set of ten videos.
per category (see Figure 1). The TENTube Channel creates connection opportunities by enabling users to see competence-related videos submitted by others, and to submit videos for others to see. The Channel also increases connectedness to videos and people by supporting the commenting and discussion of individual videos. Two further connection-oriented embedded mechanisms include tagging videos with specific competences and rating.

![Figure 2: The TENTube Network Visualization and Navigation Tool](image)

### 3.2 Network Visualization and Navigation Tool

A network visualization and navigation tool (NVNT) helps users visualize and browse through the links between three types of objects: people, videos and competences/tags (see Figure 2). There are also a number of relationships/links such as:

- “Video ← is related to → Competence/Tag”
- “User ← has submitted/seen → Video”
- “Video ← has inspired → Video”

“User ← knows → User”

The NVNT supports productive connections by enabling users to freely navigate through the different relationships and networks, and access other members’ profiles. Further connection-oriented embedded dynamics include the possibility to search specific sub-networks, as well as a “time-machine” enabling users to explore the evolution of the network over time, showing for instance the growing popularity of a specific video or competence.
3.3 Game

The TENTube Game proactively encourages users to access videos and connects users to each other. Each game is played between two anonymous players, and can consist of several rounds in which players can view one or more videos. These two players can continue to view videos and play with each other until one of them wants to stop. At the end of the game, the two players are asked if they wish to reveal their identity. If they both agree, they are connected to the profile and network of the other player.

The logic of the TENTube Game is similar to the ESP game [19] and the ProfilAMat game [20], with the exception that the object the users play with is one of the competence-related videos included in the TENTube Channel. During each round, two players view the same video in parallel and try to describe it with one word. Each player can type as many words as they want while they watch the video. Each player can type as many words as they want while they watch the video. Players get points for each matching word in their list. At the end of each round/video, points are attributed using an approximately U-shaped scoring function dependent on time (i.e. video duration). In addition, points are subtracted if no match is made during a round. Players are then taken to the overall scoreboard page that lists the top scores and asked if they wish to continue playing. If they both agree, they are proposed a new video. If they are not interested in the video proposed they can pass; however, points are also subtracted if players pass too often. Figure 3 shows a screen from the TENTube Game. A key design principal of the TENTube Game is the selection of the relevant videos and the matching/connection of users. For each game, the video and users are selected by a Connection Agent operating with an algorithm described in the section 3.4. This algorithm assumes that at least two users are online and willing to play. If this is not the case, the user can play against the machine. Finally, after a video has been used in a TENTube Game session, the event and matching words/tags are communicated to the video’s author. This may stimulate the author to revise the video, or to submit new videos.

3.4 Connection Agents

TENTube contains embedded connection agents which gather information about a user’s profile and system use, select the most appropriate competence-related videos and users to connect with, and stimulate users to watch and submit videos. In the TENTube game, the video and users are selected by a
connection agent operating with an algorithm of the type:

- The video has not already been seen by the two users
- Maximize “similarity” between the two users (for example, have similar competences)
- Maximize matching of proposed video tags with tags/competences of other videos seen by the two users (interesting user-video connection).
- User’s preferences (the game can ask at the beginning if the users have a preference for videos in any of the three categories).

Connection Agents identify “similarity” among users as a function of their behavior (e.g. which videos they have seen, submitted, and which competences they have or would like to acquire). Connection Agents also connect people by suggesting that users view the profiles of “similar” users or that they browse through a “similarity” network displayed using the NVNT.

4. Conclusions

Our research focuses on stimulating knowledge exchange in online communities and learning networks. We are primarily interested in motivating users to establish connections that do not exist by creating awareness, stimulating interest, and providing a pretext for making new connections. We also aim to strengthen connections that already exist by encouraging individuals to “reconnect” from time to time. To this end, we are currently developing advanced features of TENTube, a video-based connection tool which supports competence development by integrating rich profiling and network visualization and navigation with agent-enhanced game-like connection dynamics. Future research plans include testing our hypotheses on how to best increase connectedness and ultimately competence development in online communities.

5. References


Situating Competence within the Person: Modelling Social engagements in the SPLICE project

Mark Johnson, Institute for Educational Cybernetics, University of Bolton
Miranda Edwards, Coleg Harlech
Graham Hall, Coleg Harlech
Bill Pollard, Cheadle and Marple 6th form College, Manchester

Abstract
This paper presents competence as inseparable from the overall viability of human beings: in situating competence within the human being, we argue that it is important to find ways of developing it through developing the whole person. This approach however requires a method of gaining deeper insight into the processes of self-management in order to determine interventions for developing the person, and to monitor the effectiveness of those interventions. The SPLICE project is directly concerned with these issues. Through the use of a social network, it has sought to model the social engagements of learners with the specific aim of creating transformed learning contexts, breaking down barriers between learners, practitioners and teachers, which embrace new technologies, and which lead to greater self-efficacy of the learner. The paper describes some of the outcomes of the initial stage of the SPLICE project, and identifies the context within which these outcomes are observed using a retroductive method. Using this method we consider possible models of the person which might help identify effective intervention for developing competence within SPLICE.

Introduction

The multi-dimensional nature of competence presents significant philosophical and practical challenges to researchers and educational designers alike. Within the TenCompetence project, these dimensions are expressed in terms of describing competence as ‘a disposition’, ‘situational’, ‘an attribution of individuals or teams’, ‘a latent attribute’ or ‘defined in a community of practice’(TenCompetence, www). Engaging in practical educational interventions to develop this multi-dimensional capacity within learners is a different level of challenge. A multi-dimensional view of competence to practical interventions have been attempted: notably by Zualkernan (2007), who in adopting Toulmin’s (1958) philosophy of Argument Types, argued that Competence could at least be more accurately assessed through the examination of a learner’s argument structures. The SPLICE project (2008), on the other hand, is more concerned with developing, rather than identifying, competence through developing the general social capacity of the learner.

In taking this approach, we advance the view that competence is inseparable from the broader categories of human existence, particularly ‘identity’ and ‘persona’ (Johnson, 2008): competence, rather than being perceived as a multi-dimensional attribute of the human being, needs instead to be situated within the human being. However, in order to situate competence within the human being, and particularly to develop ‘social capacity’, a method is required which can monitor the extent to which we believe such capacity is
present – both in terms of identifying appropriate interventions, and in monitoring the effectiveness of those interventions.

SPLICE has addressed this problem of monitoring by using models of the person created through a combination of cybernetic techniques drawing on the work of Beer (1981), and a retductive approach drawing on the work of Pawson and Tilley (2004). Both of these approaches have been used separately on projects related to SPLICE, notably the use of retroduction in the MANSLE project (Johnson, 2008) and the use of Beer’s Viable System Model in work on Personal Learning Environments (Johnson and Liber, 2008). This combination of approaches in SPLICE allows for a dynamic approach to modelling which is grounded directly in the experiences of learners and teachers on the project, and which can both provide explanations for some of the phenomena experienced, as well as guide interventions.

The SPLICE Project

The focus of the SPLICE project is on the creative industries, a sector which is growing at a significant rate, although one which is predominantly populated by small businesses. The objective of SPLICE has been the establishment of a social network involving practitioners, learners and teachers and to find ways of connecting these different constituencies up. The fundamental presuppositions of the project are that the effective use of new technology is essential to effective teaching, learning and industrial practice, and that effective usage is habitual. It therefore remains as a fundamental educational challenge to establish technological habits in teachers, learners and practitioners.

The challenges of establishing effective technological habit, however, are not only technological: the reticence of learners, teachers and practitioners to engage in new technological practices appears to indicate deeper personal affective barriers. Thus in trying to overcome these barriers, an intra-disciplinary approach is required which can address both technological as well as deeper psychological and social issues within a unifying conceptual framework. It is for this reason that SPLICE had adopted a retductive methodology to suggest possible mechanisms which might explain the observed phenomena of the project – including the variation of engagement between individuals.

Retroduction, as Pawson and Tilley describe it, involves the identification of possible mechanisms that might be responsible for observed outcomes, and the identification of relationships between those mechanisms and possible contexts which might contain them. It is a creative approach to research and evaluation – not unlike the work of a detective – where many possible mechanisms may be considered, and tested against one another for their respective explanatory and predictive power. The approach is grounded in the philosophy of Critical Realism, which argues that whilst knowledge of observed phenomena is necessarily subjective and relative, those phenomena are the product of real mechanisms about which objectivity is possible (Bhaskar, 1979).
The Context of SPLICE

The SPLICE network exists in parallel to a number of courses that learners are engaged with across a number of different institutions, but primarily within Coleg Harlech. In the first phase of SPLICE, learners have been commended to participate in the network, but have not been forced to do so. As a result, although the network has a large number of members (about 88), there is wide diversity in the degree of engagement of those members. It is through studying and modeling the types of behaviour exhibited by learners that SPLICE seeks to identify effective teaching interventions.

For the learners who are part of SPLICE we can describe the context for their engagement as comprising two key elements:

1. Course of study – student and teacher members of the SPLICE network are all engaged in a particular course of study either at Coleg Harlech in multimedia, or in related courses in three other FE institutions. Although engagement with the network is strongly encouraged, it is not (in the first phase of the project) enforced.
2. The diverse community of practice that different participants belong to: teachers, learners and practitioners, and the normative patterns of practice existing between those groups.

Within these two aspects of the context of SPLICE are aspects which may have an impact on the behaviour of learners within the network. For example:

1. Within the body of learners engaging in the network, there is a range of physical proximity in terms of the relations between network members (some students for example, know each other well in a face-to-face context, whilst others have never met).
2. Within the body of participants on the network, there is a range of power relations that exist. Obviously, the power relations between teachers and students, but also unseen power relations between peers, and possibly ‘implicit’ power relations between practitioners, learners and teachers.

These aspects therefore may have a role to play in explaining the diversity and types of behaviour exhibited by learners within the network. Indeed, whilst these aspects may be considered the ‘context’ of learners’ behaviour, the extent to which that context is actually part of the mechanism of behaviour in the learner is sometimes difficult to determine. Nevertheless, the identification of this context allows us now to think of what mechanism might produce the sorts of learner behaviour that has been observed within the project so far.

A Mechanism for Social Engagement within SPLICE
In thinking of possible mechanisms to account for differences in learner behaviour on the network, there are a number of well-established approaches. Within psychology, for example, the concept of ‘personality type’ can help distinguish particular patterns of behaviour within individuals. Here however, we adopt a different approach. Instead, we attempt to understand the participant as a ‘viable human being’, and that all the perceived behaviour of individuals within SPLICE is consistent with the maintenance of viability of each person. Given that there is a diversity of this behaviour and a wide range of actions undertaken by different participants, it follows that there must be a number of ways in which a person manages their viability. Moreover, whatever methods the person might use to maintain their viability, these methods may be changed, and the person organise themselves in a different way.

To conceptualise this ‘personal viability’ we use Beer’s Viable System Model. This approach was taken for the characterisation of the Personal Learning Environment, and Diagram 1 shows the Viable System Model of the viable learner used there, which presents a way of describing the different regulating mechanisms of a person. Johnson and Liber explain these different regulating mechanisms as dividing into a number of systems shown on the diagram from 1 – 5.

The VSM model of the Personal Learner comprises a number of different numbered systems. System 1 (1) contains the various learning activities that need to be managed. System 2 (2) is a regulating mechanism that seeks to ensure that system 1 activities do
not conflict: this may take the form of timetables or a module map. System 3 (3) is a regulating mechanism that seeks to ensure that system 1 activities are optimally organised with the appropriate resources that they need. System 3* (3*) is a regulating mechanism that gives feedback about the performance of the system: in the case of the ‘personal learner’, it equates to the learner asking themselves occasionally “am I learning what I should be?” System 4 (4) is a regulating mechanism that seeks to ensure that the organisation of system 1 activities is capable of adapting to environmental changes. In order to do this, system 4 must monitor the environment for potential change, consider the possible consequences and explore the need for adaptation: for the personal learner, this relates to ‘self development’. Finally, system 5 (5) concerns longer term survival strategies as well as maintaining the ‘identity’ of the system: for the personal learner, this system considers the deepest questions of “who am I?” and “what do I want to become?”

Each regulating system, 2 – 5 plays a role in maintaining the viability of the person. However, viability may be maintained either through an equal balance of regulatory activity throughout the systems, or through particular emphasis on one type of regulation. Thus there are a number of ways in which a person may maintain their viability. For example, a focus on system 3 to the exclusion of other regulating forces, would result in the maintenance of a ‘status quo’ of activities or social relationships. Whilst this might be viable, without effective system 4 regulation, such an arrangement would be vulnerable to environmental change.

System-2 focused regulation, on the other hand, would be purely reactive in the absence of effective coordination of system 3. Thus the continual need to avoid conflicts in activity would result in a ‘fire-fighting’ mentality which relies on wits and instinct rather than rational determination. On the other hand, system 4 focused regulation is highly rational in exploring models of the person in the environment and projections of the future. But over-focus here could lead to undue concerns and reticence about the consequences of action. It is within this domain that fear over the consequences of power relationships, or fear over the potential consequences of engagement with online communities would reside. Finally, a focus on system 5, which is fundamentally concerned with ‘ethos’ and ‘identity’ power differences may be overcome if a moral ‘cause’ is identified - although possibly at the cost of alienation from the social group.

Thus, using the VSM model of the learner, we have a possible mechanism which could generate the sort of diverse behaviour that is seen in the SPLICE network. However, given this mechanism, and our underlying purpose in ‘situating competence’, how might an understanding of the context and mechanism in SPLICE be useful?

**Using the mechanism to identify interventions**

Like any model, our model gives us access to some of the ‘controls’ of the person, and with these controls, it may be possible to steer particular interventions. Given the four regulating systems we have mentioned, for each one we might suggest strategies for
balancing regulation within the person such that no one regulating system becomes dominant.

For example, for a system-2 regulated person, the main characteristic of behaviour is ‘instinct’. Such instinctive behaviours are easier to discern in face-to-face settings than in online settings: for example, managing the bustle of social engagement in a crowded room demands precisely this sort of regulation. However, in an online environment, such instinctive regulation relies on the acquisition of effective technological habits. But for system-2 people who do not possess such habits, their establishment presents considerable problems, unless ways can be found of engaging with instinctive behaviours which might then lead to the establishment of technological habits. One way of doing this, which is currently being explored in SPLICE, is to use artistic creativity. By its nature this is instinctive and often tactile, but it can also become a vehicle for online engagement.

Interventions for a system-3 regulated person involve the introduction of strategic insights into the possibilities of engagement with new communities outside the ones that they currently maintain: in other words, the make the learner aware of the other regulating mechanisms at work.

With interventions for a system-4 regulated person, the fear of potential consequences needs to be overcome, whether they apply to perceived power relations or to lack of trust in the technology itself. Like system-2 regulation, creative practice may offer a way of dealing with these problems: an encouragement to appeal to instinct and irrationality may counter-balance over-rational projections of the future.

Finally, for a system-5 regulated person, the issue may be that there might be confident action within the network which is nevertheless poorly targeted, and sometimes single-minded. Not unlike the System 3 person, the intervention might be to encourage greater awareness of the social context, and social opportunities for action.

**Patterns of behaviour within SPLICE**

Within the SPLICE network, specific instances of behaviour support this model of the context and mechanism. The network has 88 participants, and the patterns of their online action vary. There have been some detailed discussions, although by far the most prevalent activity has been the exchange of videos, photographs and inter-personal comments. The exchange of inter-personal messages is the dominant activity on the network, with 80% of participants on the network having exchanged at least one message. This is often done shortly after joining, and in many cases does not continue much beyond that initial period.

A much smaller percentage of members have engaged in posting up their own photographs or videos. Of 142 photos, and 42 videos, these have been submitted by about 10% of the participants. Forum discussions have tended to engage a slightly different constituency of SPLICE members, although this engagement has been more consistent
over a long period of time. Forum discussions are more directed in their aim, and contributions to them have been more ‘rationally’ expressed.

The challenge within the network is clearly to engage those who have not engaged in other ways. In line with the model, a recent emphasis has been placed on non-rational forms of communication. The project is investigating a number of ways of doing this, ranging from the use of the ‘Sketchcast’ (2008) service, to the use of video, photography, and physical artistic engagement – for example, in ceramics. This has served as a vehicle for learners engaging with the online community in different ways, whilst at the same time avoiding the explicit ‘directness’ of text-only online communication. Twitter (2008) has also been used as a way of engaging learners in a less ‘direct’ way.

**Conclusion**

The establishment of competence within the person necessitates the development of habits with new technologies and the consequent development of self-efficacy. We have shown how, without specifically identifying the elements of competence, technology and modelling can be used both to diagnose learners habits, and to identify the ways in which interventions may be structured that give learners the ability to develop online technological habit.

The models we have produced on SPLICE have indicated two areas of intervention as important in establishing greater online social engagement. The importance of creative action, or actions that are not immediately rational, appears to be a key lever in being able to change technological practice and develop these habits. Secondly, the raising of awareness of the different regulating mechanisms is also an important strategy in encouraging learners to be more flexible, adaptive and responsive in their online engagement. The model that we have produced for the context and mechanism within the SPLICE project provides an explanatory framework for this approach. Given the ability to situate observed behaviour, and to relate this situated behaviour to types of interventions, there is the possibility to develop a diverse range of different strategies which SPLICE is currently investigating. Whilst the eventual outcomes of this are as yet unclear, the modelling approach is providing an effective steering mechanism for the project and its continual application will lead to refinements to the models and teaching approaches that eventually emerge.

Whilst it is unlikely that all learners will engage effectively in the online social environment, the necessity for establishing effective technological habits is clear. Moreover, as the technological environment enables learners increasingly to steer themselves in the engagement with the ‘content’ of their learning, the role of teachers in equipping learners with effective technological habits to do so is becoming paramount. Thus SPLICE directly addresses the question that it may be not for teachers to make learners competent in their subject domain, but instead to instil the habits whereby learners can make themselves competent and confident social actors.

**References**
Bhaskar, R (1979) *A Possibility of Naturalism* Sage
Johnson, M; Liber, O (2008) The Personal Learning Environment and the Human Condition: from Theory to Teaching Practice *Interactive Learning Environments, v6, no. 1*

SPLICE (2008) [www.bolton.ac.uk/projects/splice](http://www.bolton.ac.uk/projects/splice)
Twitter (2008) [www.twitter.com](http://www.twitter.com)
Sketchcast (2008) [www.sketchcast.com](http://www.sketchcast.com)

TenCompetence (www) What is meant by the term competence?
[http://www.tencompetence.org/node/123/#q5](http://www.tencompetence.org/node/123/#q5) (viewed 1/7/2007)

Dialogic learning and interactive groups: an IMS LD template integrated in runtime systems

Davinia Hernández-Leo, Mar Pérez-Sanagustín, Patricia Santos, Sergio Sayago, Dai Griffiths, Josep Blat
Contact: Davinia Hernández-Leo
Universitat Pompeu Fabra, Information and Communication Technologies Department
Estació de França, Passeig de Circumval.lació 8
08003, Barcelona, Spain
Phone: + 34 93 542 1428
Fax: + 34 93 542 2517
Email: davinia.hernandez@upf.edu

Dialogic learning and interactive groups have proved to be a useful methodological approach used in educational situations for lifelong adult learners. The principles of this approach stress the importance of dialogue and equal participation also when designing the training activities. This paper adopts these principles as the basis for a configurable template integrated in runtime systems. The template is formulated as a meta-UoL which can be interpreted by IMS Learning Design players. This template serves as a guide to flexibly select and edit the activities during the communicative action. The meta-UoL has been used successfully by a practitioner so as to create a real-life example, with positive and encouraging results.

Keywords: IMS LD, lifelong learning, pedagogical model, template, authoring, enactment

1. Introduction

Some of the main problems of lifelong competence development are related to the enormous diversity among lifelong adult learners. This diversity encompasses a large number of factors such as age, gender, culture but also aspects such as needs and interests. The complexity of this context is also emphasized by the fact that lifelong learners have already accumulated experience in informal learning settings, typically associated to real-life situations. This is the rationale behind the research on pedagogical models that is being conducted within the European TENCompetence project. In this project a pedagogical model is considered to be a representation of a pedagogical activity using the IMS Learning Design (IMS LD) specification [1] which can be used for authoring and delivering learning activities [2]. This representation does not need to be a full ready-to-run Unit of Learning (UoL).

In this paper we adopt the methodology used in Agora as a significant basis for approaching TENCompetence pedagogical models. Agora is an association within the La Verneda School for adult education [3]. Their main objectives are to address social exclusion by providing opportunities for people to train and to update their skills. Through these actions, not only do participants improve their access to the labour market but also their participation in society. Agora’s principles are based on democratic participation. Every participant has the opportunity to contribute in a myriad of decision spaces. In this way, the methodology used in their training activities relies on dialogic learning and interactive groups approaches [4]. The main idea is that people help each other in their process of learning and that group work should promote solidarity, dialogue between equals, express implicit knowledge and the abilities or cultural intelligence of all the participants (learners and instructors).

On the other hand, this kind of methodology makes significant demands for flexibility in terms of the actual running of a UoL based on these approaches. Not only may unexpected situations occur which would require a UoL to be modified on the fly [5], but it may also be required that the participants should be able to participate in the (on-going) dialogic design of
the UoLs. This situation demands a different approach to the current IMS LD implementations in which authoring tools are not integrated in runtime systems and where UoLs need to be planned in advance [6]. This paper proposes adopting the ideas of dialogic learning and interactive groups to develop an IMS LD template (using a terminology according to the framework proposed in [7]) that can be directly integrated in runtime systems. The template is computationally represented in the form of what we call a meta-UoL, which is a fully-fledged UoL offering abstract information derived from other more concrete UoLs. This template incorporates dialogic learning methodological ideas so that participants can refine the template into completely defined UoLs according to the needs of their particular learning situation.

Therefore, the aim of this paper is twofold: to define a pedagogical template based on the principles of dialogic learning and the interactive groups, and to formalize the template in an IMS LD interoperable format so that it can be integrated and directly refined (authored) in runtime systems. The rest of the paper is structured as follows. Section 2 deals with the formulation of the pedagogical template. Then, Section 3 illustrates the template integrated in the SLeD system [8] and its particularization with a real-life example. Finally, Section 4 concludes this paper indicating the future work planned to enhance this approach.

2. Template based on dialogic learning and the interactive groups

The seven principles of dialogic learning lay the foundations for implementing the template: egalitarian dialogue, cultural intelligence, transformation, instrumental dimension, creating meaning, solidarity and equality of differences [3]. In consequence, the template identifies seven different types of activities and enables the user to make different types of design decisions, namely: if an activity type appears and when, the activity description (task), the tool support, input resources (supporting the activity), and the output artefact (resulting from the activity).

For the latest three aspects, the template offers some hints or indications that may be useful to the user when refining the template into a completely defined UoL. These indications and a brief explanation of each activity are shown in Table 1. Both trainer and learners (all considered as playing the same role: participant) can plan the design either a priori or during the communicative action.

Table 1 Summary of the types of activities and the associated design decisions needed to refine the proposed template into a complete UoL.

<table>
<thead>
<tr>
<th>Type of activity</th>
<th>Design decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NEGOTIATING</strong></td>
<td>Tool support: indicate the tool or tools to support the activity, suggestions are: Doodle or Forum to discuss about a topic [...] Input resource: upload a comment or file to support the negotiation activity.</td>
</tr>
<tr>
<td><strong>DIALOGUING</strong></td>
<td>Tool support: select means of communications based on the equality of learners and coordinators whose comments are not classified as better or worse but appreciated as different [...] Input resource: for example a list of discussion points [...]</td>
</tr>
<tr>
<td><strong>SHARING</strong></td>
<td>Tool support: provide spaces of relation and exchange among the learners themselves and between learners and trainers. Suggestions are: Blogger [...], SlideShare [...], Flickr or Youtube [...]. Input resource: motivate the sharing with a resource [...]</td>
</tr>
<tr>
<td><strong>DISCOVERING</strong></td>
<td>Tool support: suggestions are Wikipedia [...] or Google Reader which allows to sort and classify your readings. Input resource: upload also a text or whatever you would like to be discovered.</td>
</tr>
<tr>
<td><strong>CREATING</strong></td>
<td>Tool support: select tools that enable everybody to contribute. Each person is different, therefore, irretrievable if not taken into account. Suggestions of tools are Wikispaces or Googledocs [...] Input resource: [...]</td>
</tr>
<tr>
<td><strong>SELF-ASSESSMENT</strong></td>
<td>Tool support: suggestions are for example questionnaires tools such as those supporting IMS QTI [...] Input resource: for example a list of tasks with deadlines or a test with its correct answers [...]</td>
</tr>
<tr>
<td><strong>ASSESSMENT (BY OTHERS)</strong></td>
<td>Tool support: a suggestion is to use a Blog where a student can upload a work and later the others can add their suggestions [...] Input resource: [...]</td>
</tr>
</tbody>
</table>
The current version of the template\(^1\) considers up to four possible different phases formalized as IMS LD acts. Within each phase, the user can select the activity type out of the seven types shown in Table 1. Once selected, the edition of the chosen activity is enabled. Both the selection activity and each of the possible “edition activities” are modelled as supporting activities. When the user finished the edition by having described the activity and the rest of aspects mentioned in Table 1, the actual learning activity is available and has the characteristics previously configured. Each design decision is codified with local properties and the effects of showing and hiding the corresponding activities is achieved with conditions.

3. Integration of the template in SLeD

The template formalized as a meta-UoL can be interpreted by any IMS LD compliant system. This section illustrates its integration in the SLeD player with an example realized by an Agora’s member in charge of coordinating and conducting training sessions related to lifelong learning of adults in information technologies. Following the guidance provided by the meta-UoL, the Agora’s member created the example in such a way that it represents the activities and the decisions that he usually performs in some of his training sessions.

The first activity he put forward to the participants is to write a document and save it in a folder. The main objective is to let participants realize that they can become autonomous users in performing this type of tasks. With this purpose, he chose the self-assessment activity and configures it according to his needs (Figure 1a). In the second activity he wanted to increase the level of difficulty and edited a task that consists of creating collaboratively a document about the towns where they were born (Figure 1b). Finally, he defined a negotiation activity in which the participants decide what they want to do in the next session. To support this activity, he decided to recommend the use of the Doodle Web 2.0 [8] tool as suggested by the UoL (Figure 1c). Since, he did not need a forth activity in the UoL, he set the design of the UoL as finished (Figure 1d).

After the trial (use of the template integrated in SLeD), the feedback provided by the Agora’s member was overall positive. Some of his comments were “If I had had this tool when I started participating in Agora, it would have helped me more,” “I was used to traditional academic formation and in Agora I saw that the teacher is not a teacher!” or “It would have been also useful for me to see the lesson plans by other Agora trainers.”

He also stressed the need for flexibility in this type of contexts, “There are many situations in which I need to improvise. Tools might not work properly; students do not have a keen interest in the topic or have specific needs, so I sometimes need to reschedule groups and activities to adapt to the circumstances.” Moreover, he provided feedback regarding the vocabulary employed in the template and suggested changing some words to enhance their comprehensibility. For example, input resources and output artefacts may be more clearly understood if formulated as “supporting resources” and “resulting products.”

4. Conclusion and future work

In this paper we propose a new approach to IMS LD authoring integrated in runtime systems. This approach is based on a template formulated as a meta-UoL, which can be interpreted by IMS LD players. This template serves users as a guide to flexibly select and configure the activities on the fly. The meta-UoL relies on the principles of dialogic learning and interactive groups and has been used successfully by an Agora’s member to create a real-life example.

Future work includes revising the template considering the results of this experience with the user and extending it with more phases and further flexible possibilities, such as enabling the modification of the activity order and their configuration once they have been configured, and adding group-based functionalities. We also plan to enrich the template by integrating more detailed support for the assessment activities. The suggestions regarding (Web 2.0) tool support need further research which can benefit from the experience of the actual use of the template by the target audience when planning the tools for their training sessions. We are also currently working on an approach for saving the users’ design decisions with sharing and reusing purposes.

\(^1\) Available online at http://www.tecn.upf.es/~daviniah/metaUoL.zip
Figure 1. (a) Selection of the self-assessment activity. (b) Final configuration of the creating-collaboratively activity. (c) Edition of the negotiation-activity. (d) UoL finishes with the third activity.

Acknowledgment
This work has been partially funded by European Commission in the TENCompetence project (IST-2004-02787). The work done in the OpenDock project represents the initial motivation of this research.

5. References
project deliverable, retrieved February 2008 from http://hdl.handle.net/1820/1148


This paper considers current assessment practice, looks at the impact of the Internet on today’s learners, and explores ways of modernising assessment to narrow the gap between the everyday lives of students and the assessment practices that we impose on them.

Keywords: assessment, web 2.0, education, learning

1. Assessment 1.0
At its most basic level, assessment is the process of generating evidence of student learning and then making a judgment about that evidence. Current assessment practice provides evidence in the form of examination scripts, essays and other artefacts.

1.1 Characteristics of Assessment 1.0
For the purposes of this paper, ‘Assessment 1.0’ can be thought of as assessment practice from the beginning of the 20th century until today. Throughout this period, assessment exhibited the following characteristics:
- paper-based
- classroom-based
- formalised (in terms of organisation and administration)
- synchronised (in terms of time and place)
- controlled (in terms of contents and marking).

These characteristics have changed little during this period; a school master from 1907 would feel at home in an examination hall in 2007. This is unique among professions. This assessment system has served us well. The highly centralised, top-down, industrialised system matched the kind of society that existed throughout most of the 20th century. Its stability has engendered widespread public confidence in the examination system in the UK (QCA, 2006) and maintained national qualifications as the primary means of entry to employment and Higher Education. The system is also widely understood by its users (students, parents, teachers, university admissions staff, employers and politicians) being relatively unchanged from generation to generation.

1.1.1 Assessment 1.5
A more up-to-date form of assessment has emerged in the last decade, which involves the use of computers in the assessment process. ‘E-assessment’ embraces ‘e-testing’ (a form of on-screen testing of knowledge) and ‘e-portfolios’ (a digital repository of assessment evidence normally used to assess practical skills). A number of commercial products have emerged such as Questionmark (e-testing) and Pebblepad (e-portfolio). These dedicated systems provided specialised facilities to support online testing or online portfolio building.

1.2 Problems with assessment 1.0... and 1.5
In recent years, traditional assessment has been the subject of criticism. The current system is struggling to cope with the demands being placed on it. It was designed to filter students by ability for the purpose of employment or university selection – not mass accreditation of student achievement. Because of its bureaucratic nature, it’s expensive to run and doesn’t scale well. Awarding bodies’ costs are rising and these are being passed onto schools and colleges, which complain about the rising burden of examination fees. It’s also inflexible, organised around annual examination ‘diets’. In addition to these practical problems, there are educational and political concerns. Some educationalists claim that the current assessment system encourages surface learning and “teaching to the test”. Instead of instilling genuine problem solving skills, it fosters memorisation. Examination papers that appear to pose ‘deep’ questions are answered by rote memory – memories that are acquired by students under pressure from parents who want to see their children gain qualifications, and drilled by teachers who are seeking to meet targets. Employers complain that, in spite of rising achievement (DfES, 2006), young people are not gaining the skills that
are needed in the modern workplace – skills such as problem solving, collaboration, innovation and creativity. Teachers complain about the rising burden of time spent carrying-out and marking assessments, which reduces the time available for "real teaching". Students complain that the only time that they are required to undertake extended handwriting is during an examination. These criticisms are not confined to paper-based assessment. E-testing has been criticised for crudely imitating traditional assessment; vendors of computer-based testing systems boast about their systems’ “faithful reproduction of the paper experience”. These systems typically support a limited number of question types (almost always selected response questions) and, at best, crude simulations of traditional tasks. Some high profile simulations have proven to be unreliable (QCA, 2006), in spite of a great deal of expenditure, leading some commentators to conclude that simulations have inherent reliability problems – problems not faced by real life assessments. Most contemporary e-portfolio systems, likewise, set-out to mirror the existing curriculum, effectively little more than online storage for students’ work, with a highly content-focused (rather than student-centred) approach to assessment. These criticisms of e-assessment mirror the criticisms of virtual learning environments (VLEs) – that they simply seek to mimic traditional classroom practice; the “primacy of pedagogy” as Cousin (2004) described it: “VLE environments (sic) tend to be skewed towards the simulation of the classroom, lecture hall, tutor’s office and the student common room.” Similarly, most contemporary e-assessment systems are skewed towards the simulation of the class test and the examination hall; or, to paraphrase Cousin, they re-enforce the “tyranny of testing” rather than seek original and authentic ways of assessing student learning. Both paper-based and computer-based assessments are perceived by students as something external to them; something over which they have no control; something that is ‘done’ to them. And the assessment instrument itself is considered contrived, just a hurdle to be jumped, not part of their learning. Or, worse, it is perceived as the sole purpose of their learning, with all their efforts going into passing the test rather than the acquisition of new knowledge and skills. Both forms of assessment also tend to focus on factual knowledge rather than deeper levels of learning, which is harder to assess using current systems. Yet, factual knowledge is valueless in a culture where Google and Wikipedia is a mouse-click away.

Assessment 1.0 (and 1.5) is also intensely individualistic. Assessment activities are done alone, competition is encouraged, and collaboration (or “cheating” in the lexicon of Assessment 1.0) is prohibited. Assessment 1.5 inherited Assessment 1.0’s obsession with security, with products proclaiming that “students are completely disconnected from the network”, with “absolutely no access to their familiar desktop tools”. Not ideal preparation for the ‘networked information economy’.

While the familiarity of VLEs has encouraged reticent teachers to experiment with them, it has been claimed (JISC 2006) that their use can actually reduce innovation in the classroom by atrophying classroom practice into traditional (classroom-based) and new (VLE-based), rather than encourage the full potential of e-learning to be explored and applied in the classroom. The use of e-assessment systems might likewise hold back progress in assessment by similarly constraining practice to traditional (paper-based) assessment and the limited form of computer-based assessment made possible by these systems.

The urge to mimic traditional classroom practice has resulted in considerable effort going into the automation of teacher behaviour through such systems as E-Rater, which aims to automate the marking of student essays. A recent review of such systems concluded: “Computer grading agrees more closely with the [pupils’] true scores than do the individual human markers.” (Hutchison, 2007) Which sounds impressive until an examination of the data reveals that human and machine marking are both unreliable – with computers slightly less error-prone than human markers.

2 Web 2.0

Meanwhile, the Internet is evolving. ‘Web 2.0’ is the name given to the current state of development. Anderson (2006) describes “six big ideas behind Web 2.0”. These are:

1. user-generated content
2. the power of the crowd
3. data on an epic scale
4. architecture of participation
For the purposes of this paper, four of these ideas are of particular relevance.

**User-generated content** refers to the ease of creating content. Web services such as Bebo, Wordpress and YouTube have made it easy to create content – and more and more young people are doing so, with social networking sites becoming a significant part of contemporary culture.

The **power of the crowd** refers to the collective intelligence that can be harnessed from large groups of people. The basic premise is that, subject to certain conditions, a large group of knowledgeable (but non-expert) users can make better decisions than any individual expert. Web services such as Digg and Wikipedia are cited as examples of this collective intelligence.

**Architecture of participation** is based on the twin ideas that Web services must be easy to use (thereby encouraging participation) and organised in such a way as to improve as more people use them. Google Search is a good example since it is very straightforward to use and its search algorithms learn from the results of previous searches. An aspect of ease-of-use is the idea that not only is new content easy to create but it should be easily created from pre-existing content or easily combined with the contents of other web services (“mash-ups”).

**Openness** not only refers to the use of open source software for many Web 2.0 services but also the philosophy of the free sharing of information and resources among users, making it relatively straightforward to capture and share information or resources, such as embedding a YouTube video in a blog. The generous copyright terms of Creative Commons licenses illustrate this philosophy.

### 3 Digital natives

It is in this environment that today’s students are living and learning. In *Digital Natives, Digital Immigrants*, Prensky (2001) argues that there is a fundamental distinction to be made between today’s learners and those of the past due to “the arrival and rapid dissemination of digital technology... an event which changes things so fundamentally that there is absolutely no going back”. He labelled these new learners “digital natives” and contrasted them with “digital immigrants”:

“The single biggest problem facing education today is that our digital immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language”.

Today’s learners are also known by other names. Diana Oblinger (2003) of Microsoft calls them the ‘Millennial generation’: “Millenials exhibit distinct learning styles. For example, their learning preferences tend toward teamwork, experiential activities, structure and the use of technology. Their strengths include multitasking, goal orientation, positive attitudes, and a collaborative style”. From the student’s perspective, ‘Net-Geners’ are “academically driven... we refuse to accept elders’ speeches or sermons at face value... our technological savvy makes us smarter, easily adaptable, and more likely to employ technology to solve problems” (Windham, 2005).

#### 3.1 Different learning styles

A common set of characteristics emerges from the literature on the digital native with respect to their learning styles. These are:

- skilled use of tools
- active learning rather than passive receiving of knowledge
- authentic learning experiences rather than contrived tasks
- task (not process) oriented
- just in time learning
- search not memorise
- doesn’t know answer but knows where to find it
- Google not libraries
- collaborate not compete.

When tasked with an assignment, a young person is likely to look-up Wikipedia, search for relevant information on Google, seek help from their friends via Hotmail or MSN, finally pulling together the resulting information into a coherent document using a range of web-based and desktop applications. Unless, of course, the assignment is the same as last year’s, in which case a simple e-mail to a friend (or someone else in their social network) requesting last year’s answer will be sufficient for these goal-oriented learners.

#### 3.2 Disjoin between classroom practice and real world behaviour

The above scenario sidelines the formal teaching and learning that the student is meant to follow. There is a growing disconnection between the lives of students
inside and outside of the classroom. “Schools should not expect students to leave the 21st century in the cloakroom; for example, many schools do not allow e-mail, instant messaging, mobile phones or blogging” (Owen et al. 2006). And the list of prohibited technologies is growing. Twist and Withers (2006) describe the ways in which young people really learn as the “hidden curriculum” – the “informal digital spaces”, such as Facebook and MSN, which students routinely use for social and educational purposes.

Students’ lives outside of school and college are increasingly media-rich and stimulating – which reflects the wider technological revolution taking place in society. As a result, education is becoming disconnected. The classroom is a sort of ‘virtual reality’; a drab, technology-free zone that bears little relation to the increasingly technological reality of the students’ lives outside of the classroom.

4 Assessment 2.0

This paper proposes an update to traditional assessment. The updated system will embrace the Internet and, more specifically, Web 2.0 – particularly the four “big ideas” described earlier. It seeks to bring the 21st century into the examination room. It attempts to do this not by ‘upgrading’ or ‘patching’ e-assessment (through simulations or machine marking or other ‘fixes’) – which can be considered Assessment 1.6 or 1.7 – but by using the same tools and techniques that students use at home and we use in the workplace.

4.1 Characteristics of Assessment 2.0

The type of assessment activity best suited to the contemporary learner would exhibit some or all of the following characteristics.

Authentic: involving real-world knowledge and skills.

Personalised: tailored to the knowledge, skills and interests of each student.

Negotiated: agreed between the learner and the teacher.

Engaging: involving the personal interests of the student.

Recognise existing skills: willing to accredit the student’s existing work.

Deep: assessing deep knowledge – not memorisation.

Problem oriented: original tasks requiring genuine problem solving skills.

Collaboratively produced: produced in partnership with fellow students.

Peer and self assessed: involving self reflection and peer review.

Tool supported: encouraging the use of ICT.

Personalised assessment does not mandate individualised assessment (the setting of unique tasks for each student); the teacher can continue to set the broad parameters of assessment activity. However, there may be flexibility in terms of time, place, contents, context and scope. At more advanced levels, learners may propose additional assessment criteria (to match their specific assessment activity) and there may also be an element of self- and peer-assessment permitted within the rubric.

The type of evidence that best fits this form of assessment would be:

- **naturally occurring**: already in existence or generated out of personal interest
- **multimedia**: existing in text, audio and video format
- **digital**: such as e-mail, instant message logs, blog posts, wiki contributions, audio and video recordings
- **distributed**: may be scattered across various sources (such as web sites, blogs, inbox, iPod).

Not all “assessment 2.0” tasks would embrace all of the above characteristics or media. But a modern assessment should seek to incorporate some of these characteristics and, certainly, permit the use of ICT.

For example, a “traditional” assessment task relating to History would ask students to describe the rise of Nazism in Germany in the 1930’s. The evidence would be an essay, produced alone, under controlled conditions without reference to notes or other support materials. The equivalent “assessment 2.0” task would set the broad area of investigation (the rise of Nazism) but allow the students to choose a specific topic (such as the support given to the Nazi Party by US corporations). The assignment would be done collaboratively, in groups set by the teacher, with each member of the group choosing a specific area to research (such as the Nazis’ use of IBM computers). The evidence would be in the form of a group blog, where each member of the team would post their findings (which would include hyperlinks to webpages, audio and video material) and the assessment would involve an element of self- and peer-assessment (along with teacher assessment). Unlike the essay, the blog may not require students to make any conclusions beyond reporting their findings via the blog, on the
basis that any conclusions reached by the average 16 or 17 year old about such a complex period in history are likely to be superficial. This would contrast with the traditional approach, which would require a structured essay that is effectively an academic paper written by a school pupil – and one greatly inferior to that found on Wikipedia (unless it was copied from there).

5 How Web 2.0 can be used for assessment

Assessment is about evidence generation. The diagram below illustrates how evidence is traditionally produced.

Evidence has to be discovered (when it already exists) or created (when it does not). The resulting information has to be captured and organised. And, once it is coherent, the evidence has to be assessed.

It is straightforward to relate this model to Web 2.0. For example, a contemporary web-based e-mail system (such as Google Mail) can be used as a repository of every e-mail message you ever send or receive – which could be an Aladdin’s Cave of assessment evidence.

Downes (2006) describes the combination of Web 2.0 services for learning as “personal learning environments” (PLEs), arguing that the PLE is a “recognition that one-size-fits-all approach of [VLEs] will not be sufficient to meet the varied needs of students”. Assessment 2.0 posits Web 2.0 as a personal assessment environment in recognition that the one-size-fits-all approach of e-assessment systems will not be sufficient to meet the varied needs (and interests) of candidates.

5.1 Advantages and disadvantages of Web 2.0 for assessment

Given that Web 2.0 is Life 1.0 for most students, it is an easy fit for most young people. They are already using Web 2.0 services as part of their everyday lives. Recognising their MySpace page or their YouTube channel seems only ‘fair’ to them. And in doing so, it would reduce the perceived chasm between education and ‘real life’. It would also provide an incentive to learners: instead of artificial tasks involving “ancient” practices (such as hand-writing or using the library), assessment could provide real challenges using real tools – the same tools that they currently use outside of class and will use in the workplace.

Web 2.0 is inherently collaborative and the antithesis of Assessment 1.0’s obsession with individuality – and collaboration is a skill much sought after by employers. Web 2.0 services are also inexpensive (or free), easy to maintain (since they are maintained by someone else), and very scalable (in fact, the more users the better). The alternatives (dedicated e-testing systems and e-portfolios) are proprietary, expensive, difficult to maintain and quickly become out of date.

Assessment 2.0 is an approach, not a toolset. Facebook, Blogger et al may come and go but social networks and blogs are part of contemporary culture and will be around for the foreseeable future. Assessment 2.0 describes a type of task and an approach to that task; the choice of tools is up to each student. Maintenance and obsolescence are not issues.

There are drawbacks. Older students (our digital immigrants) aren’t using Web 2.0 services – or, at least, not routinely. They don’t have MySpace pages or YouTube videos to be plundered for accreditation of prior learning. And they may lack some key Web 2.0 skills (such as search skills) and attitudes (such as a willingness to share). Our digital natives themselves may not want to mix their public and private lives in the way suggested in this paper. They may want a clear dividing line between their academic lives and their personal lives, and may resist attempts to mix the two.

Assessment 2.0 also poses challenges for teachers – who are often the epitome of the digital immigrant. Not only might they lack the IT skills needed to understand Web 2.0 services but they may lack the knowledge and experience required to appraise students’ work produced using these tools.

Teachers also lack the rubrics required to assess Web 2.0 skills. Rubrics are required to address self- and peer-assessment, and collaboration. Group work is notoriously difficult to assess – so difficult that most awarding bodies prohibit it from high stakes assessment. Yet, it is at the core of Web 2.0 and a crucial skill for the workplace. New media presents new environments for students – environments such as Second Life and The Sims... and new challenges for awarding bodies to develop marking schemes to appraise student activity in these domains. Authentication is another problem for awarding bodies in the world of Assessment 2.0, with the myriad sources of digital evidence and collaborative inputs making it difficult to isolate and prove ownership of an...
individual piece of work. Self- and peer-assessment have proven to be valid and authentic forms of assessment but neither type of assessment has been widely used in schools or universities.

6 The future

It’s impossible to predict the future. But there are certain themes that emerge when you review the literature relating to the future of education and technology. With regard to education, there is a consensus about the following:

- greater focus on education as a key differentiator between countries in the global economy
- growth in learning at all stages in your life (the “forty year degree programme”)
- emergence of new skills to better fit the networked information economy
- greater role for e-learning (including mobile learning)
- move towards personalised learning (and, by corollary, personalised assessment)
- greater recognition of informal learning.

In tandem with these educational developments, the next decade will see two major technological developments: the emergence of ‘ubiquitous computing’ and ‘Web 3.0’. Ubiquitous computing describes a state of pervasive computing where digital devices are embedded into everyday life to such an extent that we are unaware of their existence. Web 3.0 will further develop the “big ideas” behind Web 2.0, particularly enhancing the intuitive and collaborative aspects of the Web. The cumulative effects of these trends will be an explosion of digitisation, communication and collaboration.

If you combine these developments, you see a digitally rich environment where learning will take place in multiple locations (at school, at home, on the bus) at a time to suit the learner; where learning is personalised – in fact, a world where the distinction between learning and living is blurred and assessment evidence occurs naturally as part of the student’s everyday endeavours. It will be a world where Bill Gates’ vision of “information at your fingertips” will become a reality and where examinations that assess memorisation (as most do today) will become untenable. It is hard to imagine, in this future, any place for the ‘traditional’ VLE or CAA system. At best, posterity may view them as necessary stepping stones to the future; at worst, the final staging post of the educational establishment seeking to control learning. Current attempts at fixing them using expensive simulations or machine marking seem doomed to failure – a black hole through which money may be poured but from which nothing (lasting) emerges.

7 Conclusion

Assessment is often accused of preventing change. Critics claim high stakes assessment dictates what is taught and stifles innovation. So, if education is to change, that change has to be led by the assessment system – and contemporary e-assessment systems might not be the best way of doing that. Assessment 1.5 (or 1.6 or 1.7) can’t win the feature war with Web 2.0. What is state-of-the-art in an e-assessment system today (say, the inclusion of video in an online test) is state-of-last-year on the Web. They can never keep-up. And they will always feel unnatural to students.

One of the ways assessment can evolve is to adopt some of the characteristics of ‘Assessment 2.0’. That means embracing Web 2.0 and the digital environments that students inhabit. Doing so would present a challenge to teachers and awarding bodies. Teachers would have to up-skill to better understand Web 2.0 and appreciate the world of the digital native. Awarding bodies would have to face the challenge of creating rubrics for assessing difficult to measure skills, such as collaboration, and confront issues such as plagiarism and peer-assessment. Both teachers and awarding bodies would have to embrace digital evidence in all of its forms and set more authentic tasks that genuinely challenge (and engage) students.

This paper is long on criticism and short on solution. But there is something wrong with the assessment system. It does need to change. The defenders of the status quo claim that many technologies promised to revolutionise education – but came and went without much of an impact on teaching and learning. Proponents of change point out that technologies such as TV and radio did revolutionise learning – just not the learning that happened to be taught and assessed in schools. To the advocates of change, similarly ignoring the information revolution will be impossible. Continued resistance will further marginalise education until change is forced...
on us.

8 References


11. QCA. GCSEs and A level: the experiences of teachers, students, parents and the general public.


Assessment Delivery Engine for QTIv2 Tests.

Gary Wills, Lester Gilbert, Jonathon Hare, Jiri Kajaba, David Argles and David Millard

Learning Societies Lab, University of Southampton, UK.
{gbw, lg3, jsh, jk2, da, dem}@ecs.soton.ac.uk

Abstract

The IMS Question and Test Interoperability (QTI) standard has not had a great take-up in part due to the lack of tools. This paper describes the ‘ASDEL’ test delivery engine, focusing upon its architecture, its relation to the item authoring and item banking services, and the integration of the R2Q2 Web service. The project first developed a java library to implement the system. This will allow other developers and researchers to build their own system or take aspects of QTI they want to implement.

1. Introduction

E-learning assessment covers a broad range of activities involving the use of machines to support assessment, either directly (such as web-based assessment tools, or tutor systems) or indirectly by supporting the processes of assessment (such as quality assurance processes for examinations). It is an important and popular area within the e-learning community [4, 1, 2]. From this broad view of e-learning assessment, the domain appears established but not mature, as traditionally there has been little agreement on standards or interoperability at the software level. Despite significant efforts by the community, many of the most popular software systems are monolithic and tightly coupled, and standards are still evolving. To address this there has been a trend towards Service-Oriented Architectures (SOA). SOAs are an attempt to modularise large complex systems in such a way that they are composed of independent software components that offer services to one another through well-defined interfaces. This supports the notion that any of the components could be ‘swapped’ for a better version when it becomes available. A SOA framework is being used as a strategy for developing frameworks for e-learning [3, 5].

A leading standard is Question and Test Interoperability (QTI) developed by the IMS Consortium. The QTI specification describes a data model for representing questions and tests and the reporting of results, thereby allowing the exchange of data (item, test, and results) between tools (such as authoring tools, item banks, test constructional tools, learning environments, and assessment delivery systems) [8]. Wide take-up of QTI would facilitate not only the sharing of questions and tests across institutions, but would also enable investment in the development of common tools. QTI is now in its second version (QTIv2), designed for compatibility with other IMS specifications, but despite community enthusiasm there have been only a few real examples of QTIv2 being used, with no definitive reference implementation [6,7].

Formative assessment aims to provide appropriate feedback to learners, helping them gauge more accurately their understanding of the material set. It is also used as a learning activity in its own right to form understanding or knowledge. Formative assessment is something lecturers/teachers would like to do more of but do not have the time to develop, set, and then mark as often as they would wish. A formative e-assessment system allows lecturers/teachers to develop and set the work once, allows the learner to take the formative test at a time and place of their convenience, possibly as often as they like, obtain meaningful feedback, and see how well they are progressing in their understanding of the material. McAlpine [9] also suggests that
formative assessment can be used by learners to “highlight areas of further study and hence improve future performance”. Draper [10] distinguishes different types of feedback, highlighting the issue that although a system may provide feedback, its level and quality is still down to the author.

2. QTI

The IMS QTI Specification is a standard for representing questions and tests with a binding to the eXtended Markup Langage (XML, developed by the W3C) to allow interchange. An example of a simple multiple choice question illustrates the core elements: ItemBody declares the content of the question itself, ResponseDeclaration declares a variable to store the student’s answer, and OutcomeVariables declares other variables, in this case a score variable to hold the value of the result.

R2Q2 focuses on rendering and responding to the 16 different types of interactions described in version 2 of the QTI specification (QTIv2). These are:

1) Choice  2) Hotspot
3) Order  4) Select point
5) Associate 6) Graphic
7) Match  8) Graphic Order
9) Inline Choice 10) Graphic Associate
11) Text Entry 12) Graphic Gap
13) Extended Text 14) Position object
15) Hot Text  16) Slider

These different types can be authored as templated questions or adaptive questions, providing an author with numerous alternatives for writing questions appropriate to the needs of the students. Templated questions include variables in their item bodies that are instantiated when a question is rendered (for example, inserting different values into the text of maths problems). Adaptive questions have a branching structure, and the parts that a student sees depends on their answer to previous parts of the branch. In total these allow for sixty-four different possible combinations of question types.

3. R2Q2

The R2Q2 service allows a student to view a question, answer a question, and view the feedback. The R2Q2 engine (see Figure 1) is a loosely coupled architecture comprising of three interoperable services. All the interactions with and within the R2Q2 engine are managed by an internal component called the Router.

The Router is responsible for parsing and passing the various components of the item (QTIv2) to the responsible web services. It also manages the interactions of external software with the system, and it is therefore the only component that handles state. This enables the other services to be much simpler, maintaining a loosely coupled interface but without the need to exchange large amounts of XML.

The Processor service processes the user responses and generates feedback. The Processor compares the user’s answer with a set of rules and generates response variables based on those rules. The Renderer service then renders the item (and any feedback) to the user given these response variables.

![R2Q2 QTI v2 Rendering and response engine](image)

Figure 1 The R2Q2 Architecture

4. ASDEL

The ASDEL project integrates with the two other assessment projects in the JISC Capital Programme call, item banking (Cambridge: Minibix) and item authoring (Kingston: AQuRate). The three projects were conceived as providing an end-to-end assessment service: AQuRate allows item authoring, which are stored in the MiniBix item bank. A test incorporates these items and is played through the ASDEL delivery engine.
Most VLEs provide tools for assessment construction and delivery, and there is no intention to replace them. Instead, the projects seek to provide a light weight suite of tools that early adopters may use to construct QTI-compliant tests and to manage delivery in a formative setting.

The QTI specification details how a test is to be presented to candidates, the order of the questions, the time allowed, etc. The ASDEL project built an assessment delivery engine to the IMS QTI 2.1 specifications that can be deployed as a stand-alone web application or as part of a Service Oriented Architecture enabled Virtual Learning Environment or portal framework.

The core components of the ASDEL system were built around a Java project library, called JQTI. The JQTI library services enabled valid QTI assessment XML documents to be interpreted and executed. The library also provided auxiliary services like the handling of QTI content packages and the provision of valid QTI conformance profiles and reports.

The Playr component of ASDEL is responsible for the assembly and rendering of output (i.e. questions and associated rubric). Initially, only an XHTML renderer was developed; however, the design of the engine enables different renderers to be plugged in.

The Validatr component provides validation of the test and also gives indications any errors. Like an Integrated Design Environment for writing program code, the Validatr also allows experienced users to correct the XML of the test. The Validatr has a visual front end, shown in Figure 3, that allows users to visualise the structure of the test and the different paths students can take through the tests.

Figure 2. Integration of ASDEL assessment delivery, AQuRate item authoring (Kingston), and MiniBix item banking (Cambridge).
The test player tool only renders the test, so the Assessr component manages the test for the lecturer or teacher. Lecturers can upload a class list from a spreadsheet, schedule the test, put embargos on the release of the test information, etc. The Assessr sends a token and a URL for the test to each student. The student logs in to the Playr using the token and takes the test.

The Assessr allows the academic to see which tests they have set, who has taken them, and which tests are shared with someone else, see Figure 4.

An extremely light weight test construction tool has been developed, called a Constructr. This is distinguished from item authoring, since it simply creates a test comprising questions selected from an item bank.
5. Conclusions

At a recent conference, the UK assessment community confirmed that kick-starting the use of the IMS Question and Test Interoperability version 2 specifications was a high priority. The conference concluded that there needed to be a robust set of tools and services that conformed to the QTIv2 specification to facilitate this migration.

R2Q2 is a definitive response and rendering engine for QTIv2 questions. While this only deals with an item in QTI terms, it is essential to all processing of QTI questions and so forms the core component of all future systems. Due to the design and use of internal Web services, the system could be enhanced if required. So while every effort has been made to ensure this service can be dropped into future systems, if necessary it can be changed to suit any application.

In the ASDEL project we built an assessment delivery engine to the IMS Question and Test Interoperability version 2.1 specifications. Like R2Q2 this is a Web service based system that can be deployed as a stand-alone web application or as part of a Service Oriented Architecture enabled Virtual Learning Environment or portal framework. The engine itself cannot function alone so a small set of lightweight support tools have also been built. The engine provided in combination with the tools:

- Delivery of an assessment consisting of an assembly of QTI items, with the possibility that the assessment is adaptive and that the ordering of questions can depend on previous responses,
- Scheduling of assessments against users and groups,
- Rendering of tests and items using a web interface,
- Marking and feedback, and
- A web service API for retrieving assessment results.

We have provided a small set of lightweight tools that will enable a lecturer or teacher to manage a formative assessment using the World Wide Web quickly.

6. Acknowledgements

The Work was funded in the UK by the Joint Information Systems Committee (JISC). All tools and source code are available from www.qtitools.org

7. References

[10] Draper, S. W. Feedback, A Technical Memo, Department of Psychology, University Of Glasgow, 10 April 2005:
http://www.psy.gla.ac.uk/~steve/feedback.htm1.
TENCompetence Simplified Assessment Model and Related Tools for Non Traditional Methods of Assessment

Milen Petrov, Adelina Aleksieva-Petrova, Krassen Stefanov
Faculty of Mathematics and Informatics,
University of Sofia, Sofia, Bulgaria,
E-mail: {milenp, adelina, krassen}@fmi.uni-sofia.bg

Judith Schoonenboom
SCO-Kohnstamm Institute,
University of Amsterdam, Amsterdam, Netherlands
E-mail: J.I.Schoonenboom@uva.nl

Yongwu Miao
Educational Technology Expertise Center,
Open University of The Netherlands, Heerlen, Netherlands
E-mail: yongwu.miao@ou.nl

Abstract

There is no doubt that low popularity of so called de-facto standards in learning environments is their complexity. One way of managing that complexity is to use rule “divide and conquer”. This is the reason for making small tools supporting work of precisely targeted audiences like assessment designers, students, authors, stakeholders, decision makers and so on. The main idea behind TenCompetence Simplified Assessment Model is to be used as integration point of such tools making possible reusability of assessment artefacts. The purpose of paper is to present TenCompetence Simplified Assessment Specification and relation with tools for non traditional competence development. In order to evaluate that specification there are designed two so called proof-of-concept tools namely 360 degree feedback editor and portfolio assessment tool. These tools will help to evaluate and verify or reject TenCompetence simplified assessment model.

Keywords: Assessment model, lifelong competence development, portfolio assessment, 360 degree feedback

1. Introduction

In today’s global world, the transfer of competence, information and knowledge is critically important. It is hard to get an overview of all possibilities of lifelong competence development and the new learning technologies that are available.

TENCompetence project aims to develop and integrate new pedagogical and organisational models for lifelong competence development according to build an European 'Infrastructure' based on integrated open source components [1].

One of the aims of the project is to design of an assessment methodology for competences, through analysis of the modern assessment methods, selection of proper methods and tools and design of basic assessment activities. The research outlines the major principles for planning and design of effective assessment and provides a framework and guidelines for the design of the unit of assessment. The offered assessment methodology comprises implementation of the following methods: 360 degree feedback, which includes peer-assessment for assessing competences and performance assessment in the domain oral presentation skills. It offers an approach and a tool for formative assessment within the learning activities in the domain information skills and a detailed instrument for summative assessment of all competences.
2. TenCompetence Assessment Infrastructure Model

The TENCompetence Assessment Infrastructure Model describes life-cycle of the assessment process. It is specified as formal specification which should implement various assessment techniques which allows development and design of assessments that are specific to competence development [2]. In the term of the TENCompetence Frameworks it’s called Competence Assessment [3]. It’s very important to make analysis which of these assessment techniques are appropriate to assess necessary qualities and attributes required for the specific role of the competence.

According to the Assessment model there are five main packages which describe all the functionalities of the assessment process (figure 1):
- Assessment design
- Item construction
- Assessment construction
- Assessment run
- Response rating

In the Assessment Design phase (or package) it is important to define Assessment Plan which is a complex object containing different factors and guidelines from the pedagogical model of the assessment. The Assessment Plan focuses on specific traits of the individual person(s) or group(s) which are assigned to it, stipulates the decision rule as well as it is based on concrete previously defined assessment policy which has to be followed.

In core of the Item Construction package stays the Item which could be a different type of item: like QTI Item or
some others forms such as demonstration item. Every item has assigned (one or more) Indicator(s) of the trait of the concrete assessed individual person(s) or group(s). For extending the functionality of the item, Hint and Feedback are included.

In the Assessment Construction package the output is the Unit of Assessment which consists of one or more Items according to the Assessment Plan. It defines the type and value of the Scale which specify how the candidate’s response has to be translated into a score.

The Assessment Run package is the process where the candidate undertakes an assessment and his/her answers are recorded in the ItemResponse for every single Item. There are two main objects: AssessmentTake and ItemResponse.

In the Response Processing package the main object is Assessor who/which could be either human or machine. First the assessor transforms the candidate’s response (Item Response) into a rubric score using the defined transformation rules. The second step is to calculate the Assessment Indicator Score (for each candidate – individual person (s) or group (s)) which is the aggregated score for all Items within the Unit of Assessment that measure the same Indicator, respectively at the end assessor compute the score on a trait, based on indicator scores (aggregating the related assessment indicator scores), which applies to only one candidate.

3. Assessment Model, Tools and Specifications

The TENCompetence assessment model is a simplified version of OUNL/CITO assessment model [4]. The reasons for simplifying OUNL/CITO assessment model for use in TENCompetence are:

• The OUNL/CITO model is extensive and complex, aiming for completeness in its coverage of all forms of assessment. This complexity has an impact on the usability of the model and a simplification could increase the adoption of its concepts.

• The TENCompetence Domain Model provides a larger framework into which the assessment model must be dovetailed. Some duplication of concepts is apparent in the two separate models, which can be removed through harmonization.

The OUNL – CITO model includes one additional stage (Decision making), which is not part of the assessment process itself, but rather of the assessment follow-up (what decisions we can take regarding further competence development of the person assessed).

In view of the difficulties experienced in representing the assessment model using the activity centric structures of IMS LD the team has developed an alternative strategy in parallel with the completion of the proof of concept tools, based on data-centric model.

This specification in-the-middle of the process will simplify developing of various tools, with possible interoperability with other similar tools in both ways (export/import). This is shown on Fig 1.

Mapping between different tools and specifications is displayed above in table 1. The main principle behind tool-to-specification matrix is: TenCompetence assessment specification can store/import QTI and LD, but cannot create or do interpretation of these (or any other) specifications/formats. After all – what is stored – that can be exported later. This assures that format of external specifications will not be broken by tools. They just can take advantages of the specifications (if needed). As later goal with growing of specification and stay more mature – then it will be reasonable development of tools and/or services, which exports from and import to these specifications. As specification is not enough verified in real-world applications, development of such tools is meaningless.
**Figure 1: Relation between TENCompetence assessment model, QTI&LD specification and first proof-concept-tools**

**Table 1 Mapping between tools and specifications:**

<table>
<thead>
<tr>
<th>Tool name</th>
<th>TenC Assessment Spec</th>
<th>QTI</th>
<th>LD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A360 editor/runtime export/import</td>
<td>Export by TenC2Qti</td>
<td>Export by TenC2LD</td>
<td></td>
</tr>
<tr>
<td>3. TenC2QTI tool/service import</td>
<td>Export by TenC2Qti</td>
<td>LD2QTI</td>
<td></td>
</tr>
<tr>
<td>4. TenC2LD tool/service import</td>
<td>Export by TenC2Qti</td>
<td>QT12LD</td>
<td>export</td>
</tr>
</tbody>
</table>

**4. Current state of developing tools**

The purposes of this proof-of-concept tools are to alert you to the roles which can be played by 360 degree feedback and portfolio assessment to enhance students’ learning, and to diversify the range of assessment approaches and formats used in competence assessment.

First tool is called 360 degree feedback editor. The 360 degree feedback is an assessment technique, used to measure an individual’s performance, by contrasting her/his own self-assessment with assessment by other people. This assessment method uses questionnaire, which are developed and adapted for each individual participant. Each participant has to fill her/his own questionnaire, all filled questionnaires are compiled and analysed together, and after that assessment report has to be prepared.

The developed tool is designed to support authoring of assessment artefacts, using bottom-up approach. It is mean that tool uses generalization - starting as authoring tool for concrete method of assessment and finishing as more general authoring tool. It covers the following three phases of TENCompetence Assessment Model: Assessment design, Item construction and Assessment construction. The figure 2 presents the screenshot of the system.

**Fig. 2: Screenshot of 360 degree feedback tool**
Second there is Portfolio assessment tool, which aims to act as a runtime environment for playing such non-traditional method of assessment as Portfolio assessment. That tool and the first one, 360 degree feedback editor, are developed as a Java Eclipse plug-ins (fig. 3).

There are some different views, portfolio assessment view, portfolio, portfolio section, text view and media player, in the developed tool. Each item (question) belongs to specific trait and has some criteria which have to be evaluated.

In the portfolio structure there are seven sections: degrees, informal learning, competence/ skills, work samples, experiences, anecdote observation and goals. Portfolio section, text view and media player serve as visualization of the different portfolio section.

5. CONCLUSIONS AND NEXT STEPS

The main point of the paper was created a simplified assessment model and a proof-of-concept tools to work with this assessment model, and that it turned out not to be compatible with IMS-LD and QTI.

The model describe assessment process as five-stages, based on OUNL/CITO model to make it operational, not just to be a model, but to be supported by real tools and assessments. The implementation is used xsd technology and proof-of-concept tools are developed to use model and specification – they can import from and export to that specification.

As its name suggests, the function of the proof of concept tool(s) is to assess the viability of the approach adopted. In this respect the most significant outcome of the tools has been the process of development itself. The development team did not find it possible to export units of assessment developed with the tool using IMS LD and IMS QTI. The best efforts of the considerable expertise available within the consortium did not prove able to resolve this problem. The conclusion was that in its current version the Assessment Specification based on a simplified CITO/OUNL model is not compatible with the policy of using IMS LD and QTI as the basis for expressing units of assessment, and for integrating these into the wider TENCompetence infrastructure. When this problem of mapping the assessment definition onto IMS LD and QTI became evident there were two ways of responding to it, each with their advantages and disadvantages.

1) Further research into improving the mapping algorithms which are used to carry
out the transformation. The advantage of this approach is that it will be possible to carry on using the simplified CITO/OUNL model which is currently proposed in the TENCompetence Assessment Specification. The disadvantage is that there is a risk that it will not possible to develop a satisfactory algorithm.

2) Revise and extend the TENCompetence Assessment Specification, using elements which are functionally similar to those used in IMS LD. The advantage of this approach is that we can be confident that a mapping between the TENCompetence Assessment Specification and IMS LD/QTI will be possible. The disadvantage is that it means including more elements in the specification, with a corresponding increase in complexity in the editing task (although this may be mitigated by appropriate tool design).

It was decided to follow both lines of work, for two reasons. Firstly, this reinforces risk management efforts within the work package. Secondly, the completed assessment tools based on the first version of the specification provide a potential comparison with those to be based on the second version currently under development. This will help to establish the degree to which it is possible to use a sophisticated mapping mechanism to reduce the complexity of the modelling task to be carried out by the author of the assessment (and, by extension, other pedagogic models).

References


[4] Educational Technology Expertise Centre (OTEC) and Open University of the Netherlands, Educational model for Assessment
Evaluation of TENCompetence proof of concept assessment tools

Milen Petrov, Adelina Aleksieva-Petrova, Krassen Stefanov
Faculty of Mathematics and Informatics,
University of Sofia, Sofia, Bulgaria,
E-mail: {milenp, adelina, krassen}@fmi.uni-sofia.bg

Judith Schoonenboom
SCO-Kohnstamm Institute,
University of Amsterdam, Amsterdam, Netherlands
E-mail: J.I.Schoonenboom@uva.nl

Yongwu Miao
Educational Technology Expertise Center,
Open University of The Netherlands, Heerlen, Netherlands
E-mail: yongwu.miao@ou.nl

Abstract

It is important to be recognized that the TenCompetence Simplified Assessment Specification is a high risk project and therefore seeks to test the feasibility of number of key components of the specification that are deemed to be the most difficult to achieve, particularly in terms of the technical solution and the assessment model. Therefore the Proof of Concept aims to test the balance between TENCompetence framework, technology, assessment model, target audience and user acceptance, addressing what is practicable and deliverable, to best address Assessment Model’s objectives. The Proof of Concept is not looking for a single end-to-end solution but the creation of set of mini-assessment environments in which key elements and their dependencies can be tested and verified sharing common Assessment Model.

Keywords: evaluation report, ISO 9241, TENcompetence assessment model, learning technologies

1. Introduction

Within the framework of TENCompetence project it was developed and integrated new assessment methods suitable for lifelong competence development [1].

Even simple assessments and assessment processes are quite complex. In so-called Simplified Assessment Model in TENCompetence project was made meta-meta-model for describing different types of assessments and helping to model some assessment processes.

The main problem is to prove if this model will work in practice. The key components which are most difficult to achieve are implementation of the model and developing different types of assessments.

The main purpose of implemented two proof-of-concept tools is to validate that assessment specification can support different parts of assessment process. That is the reason this paper to presents the experimentation and evaluation of that tools: the assessment editor and run-time assessment tool which help “end user” to work with specification and try to implement examples from real situations like 360 degree feedback and portfolio assessment.

This outcome evaluation of the proof-of-concept tools is based on the period between 1st September 2007 and 31st October 2007. The aim of the evaluation was to measure the extent to which the tools met their aim of developing (matching to requirements) and tested the feasibility of
number of key components of the TENCompetence Assessment Specification that are deemed to be the most difficult to achieve, particularly in terms of the technical solution and the assessment model. It is based mainly on the results of the functional testing of the systems, based on the use of several test scenarios, intended to evaluate how the tools developed match to the requirements. As these are proof-of-concept tools, less attention was given to questions such as usability, user interface, etc.

In general the proof-of-concept tools have following functionality: first tool edit assessment specification and second one play role of run-time tool (fig. 1).

![Figure 1: Functionality of tools](image)

2. Methodology and instruments

The contribution of WP6 task 3 is at least two fold:

- new assessment model has been proposed
- proof-of-concept tools of the Assessment Model Specification are provided

This fact is reflected in the different validation approaches. One methodology is used to evaluate the functional quality of the tools (using developer review checklist), and another to rate the interface and usability of the systems (through user questionnaires). The following two evaluation instruments were used:

- Developer review checklist
- User Questionnaires

More attention was given to functional testing, as this was the principal goal of our evaluation.

The evaluation of the quantity and quality of the software was not the focus of this evaluation, as the purpose of the applications concerned is to provide proof of concept for the TENCompetence Assessment Specification. Nevertheless, we provided the source code to two evaluators who carried out an expert inspection.

2.1. Developer review checklist

The two examples evaluated were e-portfolio assessment and 360 degree feedback, as initially planned.

The method developer review checklist included two check lists:

- check list with portfolio example
- checklist with 360 degree feedback example

The functional testing of the tools is based on the Test Cases. For each Test Case we defined several tests that had to be executed and recorded in the Actual result field of the Test Case. For the convenience of the evaluator/tester we had already filled in the Actual result field and she/he marked the test as Passed or Fail and carefully recorded all errors, problems and observations in the Notes field.
The test cases include: people have some scenario described in separate document (pdf/doc). They must download document, download tool (second tool – means assessment player), download prepared self-assessment (which is already designed and developed with first tool), and to complete self-assessment process. After that they send results to the tutor. Next they must fill feedback form which is analysed in that paper.

2.2 User questionnaire

The purpose of this instrument is to assess the usability of software. It does so by asking users a number of questions regarding how easy the software can be used, using a questionnaire. This questionnaire is structured in two parts:

- General information about the user and his/her experiences with using information technologies.
- Evaluation of the tools adapted from some principles like suitability of the system, controllability and conformity with user expectations.

The questionnaire comprises 29 items adapted from the six design principles of ISO 9241 (Part 10) which provides information that can be used within iterative software development [2]:
- suitability to task
- self explanatory
- controllability
- conformity with user expectations
- error tolerance
- suitability for individualisation

The statement of each item is assessed on a five rating scale starting from 1 (“predominantly disagree”) to 5 (“predominantly agree”). A further option (“no option”) is offered to reduce arbitrary answers.

We used groups of students in software engineering in their first year of study, in order to make self-assessment and position them in course “Programming fundamentals”. They have a variety of backgrounds.

In the figure below shown the part of the given user questionnaire (fig.2):

![Figure 2: Part of the given user questionnaire](image)

3. Evaluation process

3.1. Procedure

Detailed evaluation instructions were written for the testers / evaluators user-guide. The testers / evaluators followed the evaluation instructions and executed the following evaluation steps:

Step 1: Download evaluation bundle which contains user guide and pre-configured self-assessment

Step 2: Register information and download Portfolio Assessment Player proof-of-concept tool, precompiled version was build for evaluation.

Step 3: Unpackage and install software

Step 4: Work with software, and return results from software to instructor

Step 5: Received feedback form for software evaluation.

Step 6: Return filled feedback form to instructor which is user questionnaire for rating the interface.

3.2. Collection and analysis of the results

This step included the collection of all data (filled in tables and questionnaires)
from the evaluation of the tools and making summary and analysis of these results.

The report should also include gap analysis by providing a general statement of the capability of the system as demonstrated by the test, compared with the requirements, stating the system deficiencies and recommending improvements of the system.

The evaluation was carried out with 40 people. They received the User Guide, representing particular evaluation process, in Bulgarian [3]. They also receive pre-assessment, which is not a traditional assessment, but rather a self-assessment of competences.

In the table below provides details of the evaluation process:

The completed questionnaires, tests, test summary, and test analysis.

Table 1: Details of evaluation process

<table>
<thead>
<tr>
<th>Description</th>
<th>Number of users</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Unique users downloads</td>
<td>52 users</td>
<td>3 – test users</td>
</tr>
<tr>
<td>unique users/after removing test-users and anonymous users</td>
<td>48 users + 1 anonymous</td>
<td>1 anonymous</td>
</tr>
<tr>
<td>Software non-unique users</td>
<td>73 Downloads</td>
<td>Software downloads and other items from site</td>
</tr>
<tr>
<td>Returned answer from assessment</td>
<td>33 users</td>
<td></td>
</tr>
<tr>
<td>Returned feedback form</td>
<td>20 users</td>
<td>3-invalid; 2-blank</td>
</tr>
<tr>
<td>Returned valid forms</td>
<td>15 forms</td>
<td></td>
</tr>
</tbody>
</table>

4. Analysis of the Evaluation Results

The results from the Functional testing show that almost all basic functionalities are in fully or partially implemented, following the use cases and scenarios established. The few items which were not implemented were not critical to use of the application. For example in the Item Construction phase of the Assessment Model the demonstration and construction items were not implemented. The list of the principal functionalities implemented, includes:

- Create an assessment plan
- Delete an assessment plan
- Edit an assessment plan
- Create an item
- Delete an item
- Edit an item
- Browse items
- etc.

The results of the questionnaire for the six design principles are summarized in the table 2 below, and provide the average response.

The average response is close to 3.5 points which indicates that user satisfaction is high.

Table 2: Summarised results

<table>
<thead>
<tr>
<th>Design principles of ISO 9241</th>
<th>Average result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitability to task</td>
<td>3.69</td>
</tr>
<tr>
<td>Self explanatory</td>
<td>3.64</td>
</tr>
<tr>
<td>Controllability</td>
<td>3.79</td>
</tr>
<tr>
<td>Conformity to user expectations</td>
<td>3.08</td>
</tr>
<tr>
<td>Error tolerance</td>
<td>3.33</td>
</tr>
<tr>
<td>Suitability for individualisation</td>
<td>3.62</td>
</tr>
</tbody>
</table>

5. Conclusions

Overall conclusions regarding the tools are:

- Responses for the six design principals targeted in this evaluation were relatively high,
with an average close to 3.5 and with the scores for all principals being higher than 3. Although this questionnaire does not go into details of the interface, the result suggests that the tools have (at the least) a reasonable standard of usability and quality.

• In formative testing during the development process several interoperability issues were identified, with an incompatibility between the Assessment Specification and the target output formats (IMS LD and QTI) [4,5]. This incompatibility meant that it was neither possible nor necessary to evaluate this aspect of the tools.

• The editor and player were stable, although some interoperability issues between them were identified.

• Testing against various small sub-components of assessment models, indicates that the specification has good modelling power.

• Expert inspection indicated that some (or more) parts are not sufficiently human-friendly, and that while the tools are useable they are still too close to the specification.

• The specification is based on xml and the documents produced are hard for a human to read, but this is possible.

It is proposed a reduction of the learning curve for using the tool could be achieved with the development of usage profiles. The candidate profiles are identified below:

1. Profile for user “assessment process designer” (or assessment stakeholder, which provides blueprint for assessment process)

2. Profile for domain expert of assessed assets (assets like knowledge, skills, traits). Under “domain expert” we recognize person which is assessment item author/editor/designer/selector.

3. Profile for assessment developer (selects items from item bank, provided by domain expert; configure required fields in order to make assessment “runnable” or “do-able”)

4. Profile for peer/self/360degree evaluator (person which run/evaluate configured assessment)

5. Profile for response rater (this profile is only identified, but is out-of-scope for current research, and developed tools). This can be target for further research.

6. Profile for decision maker (as profile in point 5 - this profile is also only identified, but is out-of-scope for current research, and developed tools). This can be target for further research.

7. Overall profile/profile for “super-admin” or “super-consultant”, which is combination of all profiles, described from (1) to (6). This profile can help in checking the assessment model and assessment process for integrity.

References


