The Elevate Framework for Assessment and Certification Design for Vocational Training in European ICT SMEs

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Abstract: This paper discusses vocational training and e-Training within the context of IT SMEs, focusing on the process of assessment and certification. More specifically, current trends in the assessment and certification of IT skills are discussed, as revealed in the study of related work. In addition, issues in traditional and e-Assessment are presented, and a new approach: "Assessment 2.0", which exploits the characteristics of contemporary trainees, is proposed. Finally, after examining relevant research projects, and current European certification programs, the ELEVATE project approach to certification and assessment is introduced with an example. More precisely, the proposed methodology for defining competence-based learning is put forward.

1 INTRODUCTION

The continuing Information and Communication Technology (ICT)-driven evolution of products and processes, coupled with the need for a low-carbon economy as well as population ageing, will mean that jobs and social structures will change: education and training, including vocational education and training (VET), must adapt accordingly (COM 296, 2010). The Europe 2020 Strategy puts a strong emphasis on education and training to promote "smart, sustainable and inclusive growth" and to reinforce the attractiveness of VET.

Actions to improve VET help to provide the skills, knowledge and competences needed in the labor market. As such, they are an essential part of the EU's 'Education and Training 2020' work programme. Also, encouraging learners to take part in VET in different countries is also a priority of EU actions, providing individuals with increased opportunities and experiences, and enhancing efficiency and innovation.

Assessments are the foundation of effective instructional practices and return-on-investment studies, since in research such as that by Glahn (2008), it is revealed that assessment does not only allow the expression but also the comparison of knowledge and competences among groups of learners. Moreover, the power and consequences of assessment have become exponentially more important with the advent of content management systems (CMS) and learning management systems (LMS) which foster communication and dissemination.

At its most basic level, assessment is the process of generating evidence of trainee learning and then making a judgment about that evidence (Elliott, 2008). Current assessment practice provides evidence in the form of examination scripts, essays and other artefacts. Furthermore, data from assessments helps drive the development of solid content and advances instructional practices.

'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), and
- controlled (in terms of contents and marking).

According to the Europe 2020 Strategy, there appears to be a need for greater flexibility regarding

how learning outcomes and competences are acquired, how they are assessed and how they lead to qualifications. In formal educational settings, for example, this is achieved through specially trained staff and the application of fine grained assessment methods. Methods which are not limited to formally strict testing, but can include observing learners on their learning course, stimulating group work, apprenticing, analyzing a learner's contributions in discussions and problem solving approaches.

A more up-to-date form of assessment has emerged in the last decade, which involves the use of computers in the assessment process (Elliott, 2008). 'E-Assessment' also 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). This approach to assessment runs tangent to the application of Software as a Service (SaaS).

SaaS is going to be a big part of the way we work and learn in the future (Marks, 2008). Some of the advantages of SaaS include: a) lower maintenance and functionality costs, b) no need for software licenses or hardware upgrades, c) increased mobility since documents are accessible anywhere, through the Internet, and d) documents are safely stored remotely.

According to Walker et al. (2004), there are six key components for the successful delivery of e-Assessment: central support, quality software, quality hardware, clear policies and procedures, integration within the learning system and staff education. Therefore, considering the advantages of utilizing SaaS, the burdens of implementing e-Assessment for an SME could be limited to just integration with an existing learning system and staff education.

Firms generally praise online training (Strother, 2002) as a cost-effective, convenient, and productive way to deliver corporate education. Results of studies, such as by Hamburg et al. (2008) however, show that less than 25% of SME (Small and Medium Enterprises) staff participates in vocational training courses and less than 60% of employers provide any type of training for their staff. This is mainly due to the fact that many SMEs have neither enough knowledge, or resources to develop and implement sustainable training strategies based on new media and knowledge processes for their own organization. Issues such as this will be analyzed in a following section, followed by appropriate proposed solutions.

One of the key qualities of formal education is to make learning processes accessible for communication in such a way that forms of assessment results (i.e., certificates) can serve as proof of the acquired knowledge and competences. This paper focuses on the certification of IT skills in SMEs and presents the rationale behind the certification approach selected for the ELEVATE project members.

In the rest of the paper, we examine related research on assessment in vocational training, focusing on the assessment of IT skills in SMEs. The paper describes current practices, as well as issues pertaining to traditional and electronic assessment. Next, we examine an update to current assessment practices, which utilizes Internet technologies and, more specifically, Web2.0. This is referred to as Assessment 2.0. Following this, the paper presents the assessment and certification approach of the ELEVATE project and describes an example of its application. Finally, the last section discusses conclusions and future work.

2 ISSUES ON ASSESSMENT AND CERTIFICATION IN SMES

Information technology proficiency among citizens is a key factor in the dynamics of Information Society development and further economic growth. In the following sections we examine specific issues which hinder the processes of assessment and certification in SMEs, and discuss related projects and initiatives.

2.1 Traditional and e-Assessment Issues

In traditional types of assessment (Assessment1.0), the formats of the examinations range from 45-120 minute restricted response (i.e., multiple-choice, identification, one best correct answer, 2/3/4 correct answers), to restricted-response adaptive modes (that stop the testing process at the point in the adaptive curve at which a passing score could be predicted at a 95 percent confidence level), constructed response (e.g., drag and drop), and "essays", simulations, scenarios and case studies involving performance benchmarks.

Traditional assessment has a bureaucratic nature, which is expensive to run and doesn't scale well (Elliott, 2008). It's also inflexible and organised around annual examination 'diets'. Moreover, 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.

The traditional assessment approach concentrates

mainly on the testing of basic skills, supposedly acquired through mainly drill and practice experiences. Such an assessment system is often referred to as a test culture (Sluijsmans, 2002). On the contrary, assessment that is performance-oriented, such as the ELEVATE project's competence-based approach, aims to measure not only the correctness of a response, but also the thought processes involved in arriving at the response.

Employers in SMEs complain that, in spite of rising achievement (DfES, 2007), young people are not gaining the skills that are needed in the modern workplace – skills such as problem solving, collaboration, innovation and creativity. Vocational education and training must equip young learners with skills directly relevant to evolving labor markets, such as e-skills, and highly developed key competences; such as digital and media literacy to achieve digital competence (COM 296, 2010).

In addition, trainers complain about the rising burden of time spent carrying-out and marking assessments, which reduces the time available for "real teaching". These criticisms are not confined to paper based assessment. E-testing has been criticised for crudely imitating traditional assessment. These criticisms of e-Assessment mirror the criticisms of virtual learning environments (VLEs) – that they simply seek to mimic traditional classroom practice.

Both paper-based and computer-based assessments are perceived by trainees 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.

Assessment 1.0 is also intensely individualistic. Assessment activities are done alone, competition is encouraged, and any form of collaboration is prohibited. Furthermore, the use of e-Assessment systems might hold back progress in assessment by constraining practice to traditional (paper based) assessment and the limited form of computer-based assessment made possible by these systems.

2.2 Issues on the Certification of IT Skills

The most basic principle of IT industry certification is that content counts. Given the global reach of IT certification, some examinations are available in languages other than English, but that depends on the subject matter.

Certification tests in the IT world are constantly being retired and replaced to meet the current state of vendor products and industry knowledge (Adelman, 2000). Testing firms do not award the formal certifications. Rather, they report examination results to vendors and industry associations that issue the documents of certification, and both vendors and industry associations may have requirements for certification beyond those of examination.

Increasingly, too, we find "cross-vendor recognized" examinations, a development that underscores the rationalizing trends in the industry, along with the competition for trained labour. Microsoft, for example, waives its networking examination requirement for those who are already certified by Novell, Banyan or Sun as network engineers, specialists or administrators. These cross-vendor recognized examinations are a prelude to the adoption of industry-wide certification standards and accreditation.

2.2.1 Related Projects

During research, the ELEVATE project discovered some highly relevant projects, which utilize competence-based training. In the following paragraphs, these projects are examined with respect to their assessment and certification approaches:

- PROLIX – Although studying the PROLIX research findings enabled the ELEVATE project to gain some important insight into competence-based training, there doesn't seem to be enough information on how these competences are assessed. Certainly, specific types of assessment are defined, but there isn't enough available information, to allow the ELEVATE partners to analyze, evaluate, adapt and perhaps integrate specific methodologies.

- TenCompetence – The TenCompetence project has yielded some interesting results, especially in the form of pedagogical tools, aiding Learning Design based on the IMS-LD standard. Yet, TenCompetence does not seem to focus on the certification of competences. It seems the validation of competences is realized outside of the system, by specific organizations. The user simply submits this certification as evidence of acquired competencies. In other words, there is no integration of the certification or assessment process within the TenCompetence system. Therefore, the TenCompetence system can be mostly utilized as a learning design tool for the

trainer and an e-portfolio mechanism for the trainee.

- The Leonardo da Vinci Programme – As part of the Lifelong Learning Programme, it funds a wide range of actions in vocational training, ranging from opportunities for individuals to improve their work-related skills through placements abroad, to co-operation projects between training organisations in different countries. With regards to certification, mobility certificates are given to organisations that have shown a particular quality in carrying out Leonardo da Vinci mobility projects (knowledge, experience and resources) and have developed an internationalisation strategy. Therefore, this Programme does not support the certification of individuals, as required by the ELEVATE SME certification requirements. However, there are a number of initiatives under development to enhance the transparency, recognition and quality of competences and qualifications, facilitating the mobility of learners and workers. These include the European Qualifications Framework (EQF), Europass, the European Credit System for VET (ECVET), and the European Quality Assurance Reference Framework for VET (EQAVET). From the initiatives mentioned above, only EQF and Europass are relevant and will be examined in a following section.

2.2.2 European Certification Programs

During research, four European initiatives relevant to certification have been identified: EITCI, ECQA, EQF, and Europass. These initiatives are presented in more detail below.

- Europass is an EU initiative to increase transparency of qualification and mobility of citizens in Europe. It aims to be a Life Long Learning Portfolio of documents containing the descriptions of all learning achievements, official qualifications, work results, skills and competencies, acquired over time, along with the related documentation. Therefore, this is not an approach to certification, but a form of e-portfolio. However, by following the specific standards and templates set by Europass, the ELEVATE user profile should be able to be adapted and exported.
- The European Information Technologies Certification Institute (EITCI, http://www.eitci.org/) has been established as a not-for-profit European, non-governmental

organization, dedicated to counteracting digital exclusion in society by undertaking research and development of IT certification methodologies and standards. The EITCI Institute currently runs two IT certification programs: a) the European IT Certification Course EITCC program, and b) the European IT Certification Academy EITCA program. Both certification programs are accessible over the Internet and are targeted at individuals and institutions, enabling formal documentation of information technology competencies. Due to a specially designed fully on-line certification procedure preserving high quality of the certificates, there is no need to undertake EITCC and EITCA examinations at a physical location. This is an important factor in overcoming individual barriers and ensuring accessibility of IT certification services to everyone. Furthermore, within the framework of the EITC Program, the Institute is currently supporting the following IT Professional Certification Paths: a) *EITC-I: Internet Technologies* - This certification path is recognized globally as a formal proof of applicable knowledge, qualifications and expertise in the Internet and eCommerce technologies domain, b) *EITC-S: Security Technologies* - This certification path is recognized globally as a formal proof of applicable knowledge, qualifications and expertise in the IT security technologies domain, c) *EITC-M: Information Management* - This certification path is recognized globally as a formal proof of applicable knowledge, qualifications and expertise in the Information Technologies management domain, and d) *EITC-D: Software Development* - This certification path is recognized globally as a formal proof of applicable knowledge, qualifications and expertise in the areas of modern software development and engineering. Although EITC covers a number of certification paths, these are too general in order to be applicable to specific SME needs. In other words, SME certification types should not necessarily conform to a European standard but should be able to adapt and merge with it. This can be achieve through ECQA which is presented next.
- The ECQA (European Certification & Qualification Association, http://www.ecqa.org/) is the result of a number of EU supported initiatives in the last ten years, where in the European Union Life Long Learning Program

different educational developments decided to follow a joint process for the certification of persons in the industry. Through the ECQA it becomes possible to attend courses for a specific profession in one country and perform a Europewide agreed test at the end of the course. If an organisation or consortium wants to propose a new European profession for ECQA certification it must apply the guidelines for ECQA certified job roles and submit a job role proposal to the ECQA board members. Criteria for Certification of EU Job Roles include: a) the job role descriptions must comply with the European standards for skills descriptions. Each skill unit team describes the skill unit, learning elements and performance criteria following the standards for skills descriptions, b) a pool of test questions must be provided using a specific standard description format (so that the test questions can be entered into the exam portals), c) the pool of test questions must contain at least 5 different test questions per performance criterion so that a test per participant can be generated generically, d) to be accepted as a profession with a crossregional and cross-national European scope the job role must additionally satisfy European dimension criteria, e) to be accepted as a profession with impact on a European level there must be a partnership agreement available (examples are consortium agreements, exploitation agreements, qualification boards) which assures that the profession and its skills card will be maintained for a number of years (minimum is 3), and f) to establish an independent and computer controlled test and certification centre all professions must use the European skills portals to administer a test pool and run all exams through it (with an independent objective board controlling the test servers and procedures).

The ELEVATE certification approach is based on the ECQA. The ECQA corresponds to the Bologna principles and European Qualification Framework (EQF). The EQF acts as a translation device to make national qualifications more readable across Europe, promoting workers' and learners' mobility between countries and facilitating their lifelong learning.

However, in order for the ELEVATE system to be in accordance with the ECQA specifications, the assessment and certification process should be carefully designed to meet specific criteria, as is described in the next section.

3 THE ELEVATE PROJECT APPROACH

Based on the bibliographical research and analytical study presented in the previous sections, we deduced the fundamental characteristics of the envisaged certification and assessment methodology of the ELEVATE educational system.

3.1 ELEVATE Project Assessment Approach

Educational innovations, such as problem and competence based education, are more likely to succeed if they include new forms of assessment, whereby assessment and learning are strongly interconnected in the course materials. Trainers in SMEs, however, usually lack the expert knowledge of pedagogists or instructional designers, required in order to facilitate this process.

For this reason the ELEVATE system incorporates a four step methodology, which allows the design of courses in which instruction and assessments are completely aligned:

- Define the purpose of the performance assessment.
- Choose the assessment task - Issues that must be taken into account are time constraints, availability of resources, and how much data is necessary in order to make an informed decision about the quality of a trainee's performance. The literature distinguishes between two types of performance based assessment activities that can be implemented: informal and formal.
- Define performance criteria.
- Create assessment forms - In these forms, trainers determine at what level of proficiency a trainee is able to perform a task or display knowledge of a concept.

The steps stated above define the necessary components for complying with the ECQA requirements., The approach could be further extended by including informal methods of assessment, used as evaluation factors to appointed performance criteria. Such informal methods of evaluation could utilize Web2.0 tools such as blogs, participation in the creation or editing of a wiki article, searching for external sources relevant to the studied topic, uploading documents/videos of the training experience or participating in online social activities such as forums, chat rooms, or social network groups.

Assessment2.0 is an approach proposed by Elliott

(2008), as an update to traditional assessment, best suited for the characteristics of contemporary learners. Trainees are already using Web2.0 services as part of their everyday lives. As a result, education and training approaches are becoming disconnected. The classroom is a drab, technology-free zone that bears little relation to the increasingly technological reality of people's lives outside of the classroom.

Furthermore, an Assessment 2.0 approach allows trainees to take more control of their own learning and to become more reflective. This was also identified as the vision of the JISC (Joint Information Systems Committee) for 2014, which funded an e-Assessment Roadmap, which reviewed current policies and practice relating to e-Assessment across the UK (Whitelock, 2007).

Unfortunately a wide range of examples that have used Web2.0 tools are not yet available in the literature. In the meanwhile, however, the way advances with Web and Web 2.0 tools are addressing the new assessment agenda have been evaluated. Four examples of summative assessment presented by Whitelock (2010), illustrate effective methods of web technologies supporting innovative practices that display a number of Elliott's key characteristics. Tried and tested pedagogical strategies have been enhanced in many of the cases examined and illustrate significant learning gains with the introduction of these technologies.

Assessment 2.0 poses challenges for trainers – 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 trainees' work produced using these tools. Furthermore, trainers also lack the rubrics required to assess Web 2.0 skills.

For the reasons stated above, the utilization of Assessment2.0 in the ELEVATE project approach is regarded within the context of informal assessment. In other words, trainees are not evaluated based on their participation in social network activities or on their skills with Web2.0 tools. For ELEVATE, Assessment2.0 is regarded as an optional, supplementary activity to regular training.

3.2 ELEVATE Project Certification Approach

The pedagogic approach to the vocational training adopted by the ELEVATE project is a competency-based development strategy. In order to achieve an efficient implementation of this approach, the ELEVATE project introduces the Competency Graph

as the domain knowledge model. Since the competence graph is developed by the domain expert through a system component, the interface should support the design and implementation of all the necessary features of the suggested approach for assessment and certification.

As mentioned before, the ELEVATE certification approach is based on the ECQA. The ECQA corresponds to the Bologna principles and European Qualification Framework (EQF). Therefore, the main goal for the certification component of the system is to be compatible with the ECQA certification template and specifications.

In order for the system to achieve this, some features need to be designed and implemented:

- The domain expert must be able to define certifications for specific job roles or professions.
- For each job role, the domain expert must be able to designate the specific competencies which are considered requirements of certification.
- For each competency, the domain expert must be able to define multiple performance criteria (i.e., skills exhibited by the trainee which serve as evidence of competency acquirement).
- For each performance criterion, the domain expert must be able to define at least five (5) evaluation questions based on the principles set by the ECQA template, as well as a factor representing the percentage of success which qualifies for a pass grade.

In addition, the ELEVATE user profile should follow the specific standards and templates set by Europass in order to allow it to be adapted and exported for the specific e-portfolio system. This would necessitate the definition of these fields in the user profile: personal information (name, birth date, nationality, contact etc.), desired employment (this could be the suggested job role defined for the ECQA certification), work experience (this is arbitrarily set by the user), education and training (this is arbitrarily set by the user), personal skills and competences (this can include information set arbitrarily by the user and acquired competences based on the ELEVATE system and categorised into team work, mediating skills, intercultural skills, computer skills etc.).

3.3 Designing the ELEVATE Project Assessment and Certification Approach

CAS is a software company based in Germany and

one of the three SME participants of the ELEVATE project. CAS develops Customer Relationship Management (CRM) solutions and provides face to face training of its developed genesisWorld software to customers and partners.

Based on the CAS genesisWorld Marketing Module e-Training analysis, which resulted in the competency graph depicted below (Figure 1), we will provide an example of the suggested ELEVATE approach to assessment design and certification implementation. The design of the training and evaluation approach will follow a specific step-by-step methodology, conforming to the templates and principles set by the ECQA association. The process, realized by the domain expert, is as follows:

1. Define the job role (i.e., skill unit)
2. Define the participating elements (i.e., competencies)
3. Define the performance criteria (i.e., learning objects)
4. Define the test questions (i.e., formal assessment)
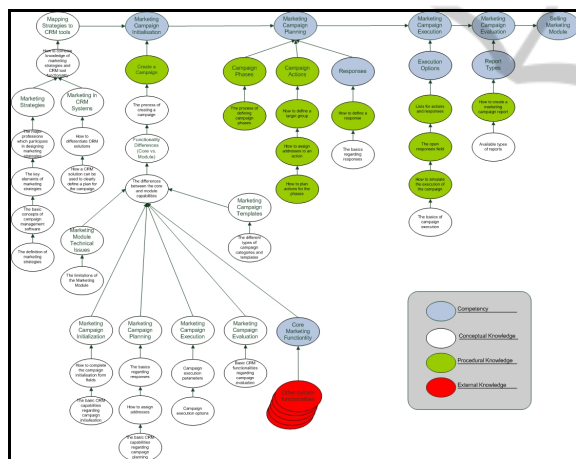5. Define the informal assessment method

Figure 1: Competency Graph for Marketing Module Training.

3.3.1 Define the Job Role (I.E., Skill Unit, Certificate)

By adopting the ECQA rules and complying with set specifications, the ELEVATE project could propose a job role, in coordination with the participating SMEs, defined based on European standards for skills descriptions. Example job roles could include: CRM Sales-person, CRM Developer, CRM Administrator etc. In essence, the job role defined by the trainer here corresponds to the certification awarded after successful completion of the course

contents.
Therefore, the first task of the trainer / domain expert is to define the job role, which will be taught to the trainees. The properties of the job role that must be defined include:

Skill Unit MM-SP: Marketing Module Sales Person – genesisWorld Sales Marketing Module
Skill Unit Acronym: MM-SP
Skill Unit Title: genesisWorld Sales Marketing Module
Skill Unit Description: This unit consists of five (5) elements: Marketing Campaign Initialisation, Marketing Campaign Planning, Marketing Campaign Execution, and Marketing Campaign Evaluation.

3.3.2 Define the Participating Elements (I.E., Competences)

Next, the tutor / domain expert has to define the required competences, which must be acquired by the trainee in order for him or her to be eligible for a specific job role or certification.

The CAS genesisWorld Marketing Module e-Training analysis resulted in the competency graph depicted in Figure 1. The goal Competency (i.e., the most general concept the trainee will learn) is the competency on the far right (i.e., Selling Marketing Module).

A competency consists of learning objects which can refer to either procedural or conceptual knowledge. When a competency only contains procedural learning objects it is coloured green and is referred to as procedural knowledge. On the other hand, if a competency only contains conceptual learning objects it is painted white and is referred to as conceptual knowledge. A competency which contains both types of learning objects is coloured light purple.

Finally, knowledge which is essential for acquiring the competency but which is not included in this part of the training is referred to as external and is coloured red.

3.3.3 Define the Performance Criteria (I.E., Learning Objects)

The Learning Objects, as used by the ELEVATE project are distinguished into categories based on the offered degree of interaction:

- **Passive:** The Learning Objects are presented to the trainee in the form of a lecture, without any kind of interaction between the trainee and the system (e.g., text manuals, video tutorials etc.).
- **Interactive:** These Learning Objects are

constructed for the purpose of interaction of the trainee with the training system, usually in order to diagnose the knowledge state of the trainee.

Passive learning objects can contain inherent degrees of scaffolding support for the trainee. These refer to the tactic of the training approach, and can be: a) implicit, and b) explicit.

The **explicit** approach (e.g., definition, example) is the simplest and most direct approach. In other words, no cognitive effort or reasoning capability is required on the part of the trainee, other than to memorise the information presented.

On the other hand, an **implicit** approach (e.g., analogy, example, discovery learning) to learning requires some form of deductive reasoning on the part of the trainee. For example, in the implicit approach of discovery learning a chapter in a book is given to the trainee and he/she has to mine the chapter for the necessary information.

Therefore, in this step the tutor defines the learning objects for each of the required competencies. Properties of the learning object which must be clearly outlined include: learning goal, id, type, source and presentation method. For example:

Learning Goal: Trainee learns the key elements of marketing strategies.
Identifier: MM-SP- MCI- MS- LO3a
Type: Passive | Implicit | Discovery Learning
Source: Book: "Customer Relationship Management" – pages 418-20
Presentation Method: Text-based document

3.3.4 Define Formal and Informal Assessment

After training for each competency, a small evaluation is carried out based on the learning objects presented and the knowledge acquired. Two types of evaluation can be defined: a) formal, and b) informal. **Formal** evaluation is based on traditional methods of assessment such as multiple choice questions, true/false statements, open ended questions etc. If the trainee fails at formal evaluation, a different training approach for the same learning object is presented.

On the other hand, **informal** assessment is based on contemporary tools of communication and collaboration such as wikis, social networks, forums, and document/video repositories etc. For example:

- Search the internet for examples of real life marketing strategies and post links of them on your personal blog.
- Define a detailed example of a fictional marketing strategy and attach it to the Examples section of the relevant wiki.

The completion of informal assessment activities is optional for the trainees, since their performance is not strictly evaluated. However, such activities enable trainees to participate in relevant communities and contribute to the development of additional training material for future generations of trainees.

3.4 Applying the ELEVATE Project Assessment and Certification Approach

The training begins with the trainee selecting a specific target competency he or she desires to acquire. Next, the ELEVATE system calculates an optimal learning path towards that goal (based on the defined competence graph of the domain knowledge) and presents the appropriate learning object to the trainee. If the trainee hasn't defined any training approach preferences, the default sequence is applied. The default sequence progresses from the more implicit approach to the most explicit definition. For example, a sequence can present: analogy, example, discovery learning and definition approaches in that order.

After studying a training approach, the trainee is presented with some feedback, with the system requiring a selection between two alternatives. The trainee can choose to examine the same learning object again, albeit with a different, more explicit, training approach. Alternatively, if the trainee feels confident enough, he or she can proceed to the assessment stage.

If the trainee selects to be evaluated, a set of formal assessment questions are presented. In order for the trainee to acquire the studied competence, he/she must answer correctly at least 75% of the questions. If the trainee is successful at the assessment, the system presents some optional informal assessment activities he/she can participate in. The trainee can then proceed with the next required competence along the predefined learning path.

If the trainee fails at evaluation, he/she is presented with the same learning object, through a different training approach. The selection of training approach is based on the default sequence or user preferences and on the questions which were answered incorrectly. If the trainee has studied all the learning object training approaches and still fails at evaluation a new methodology is attempted.

For each round of training-assessment-failure, the system presents the trainer with the default sequence of training approaches. The difference is that in each round, the most implicit training approach is ignored.

This method leads to a gradually increasing level of explicitness in the learning object training approaches. If the trainee continues to fail, even with the most explicit approach, the system restarts.

Finally, when the trainee completes the learning path, and acquires all the associated competences along the way, the system checks to see if any of those competences participate in the requirements of a certification. If the necessary competences have been attained, the system awards the certification. Alternatively, the system informs the trainee of his progress towards certification and suggests competences which should subsequently be acquired.

4 CONCLUSIONS & FUTURE WORK

This paper discussed vocational training and e-Training within the context of IT SMEs, focusing on the process of assessment and certification by examining relevant work, research and projects. Next we proposed a methodology, in order to aid SME in the design of the training, evaluation and certification approach, which conforms to the templates and principles, set by the ECQA association and Europass standard.

Currently, a prototype of the ELEVATE e-Training system is being tested and evaluated at the three participating SMEs. Based on the comments and suggestions of the evaluators we will ascertain the effectiveness and applicability of the proposed methodology and if necessary augment the e-Training system with desirable functionality.

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