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THE ABT METHODOLOGY EMPLOYMENT FOR VET OF QUALITY AUDITORS

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ABSTRACT

This paper presents some achievements of the project entitled "Disseminating Open and Innovative Tools and Services for Vocational Education and Training in Quality Assurance" (acronym Do-IT) financed by European Commission. The recent developments and results obtained during pilot testing of new pedagogical models and services, in Do-IT project, targeting engineering education in Romania are presented. This include the activity Based Training methodology (ABT) for quality management system audit course according to ISO 19011 and ISO 9001 and evaluation of theoretical achievements with Student Response System (SRS).

Keywords: Quality auditors, Quality assurance, Vocational Education and Training, Activity Based Training, Student Response System

1. Introduction

In-company training is one of the critical skills and key constraints to economic growth and development in Romania [1]. The project *Disseminating Open and Innovative Tools and Services for VET in Quality Assurance* (Do-IT) tries to solve this challenging problem by disseminating and deploying successful state of the art large-scale skills upgrading solutions from Norway to Romania. The project is promoted by Sør-Trøndelag University College in Trondheim Norway (HiST) in partnership with "Petru Maior" University of Tirgu Mures Romania (UPM) [7].

Do-IT project disseminates a new type of learning environment that improve the quality of existing training materials and study paths, in combination with dissemination of new pedagogical methodologies. It offers easy access to the best cost-efficient production process solutions that help improving Quality Auditors/Quality Managers in industrial production process training, while maintaining the best tolerances of the production parameters. Furthermore, Do-IT disseminates an innovative training environment that utilizes the advantage of visual communication in such a way that QA/QM specialists and instructors improve the quality of their work. They may evaluate the industrial use cases and select and combine the best practice for the relevant solutions in real life production in order to make up alternative decision routes, that reflects the most economical and technical production tasks.

Do-IT is disseminating a new type of learning environment that addresses modernization of the Educational System and the technological need for facilitating industrial quality management assurance designs in fabrication process training at Vocational Education Training (VET) schools. This is done by disseminating pedagogical practices and video technology solutions through three main points of interest:

- Facilitate the competitiveness of European SMEs by reduction of QA production costs in a technically efficient way,

- Improve QA processes by providing risk analysis to VET training and learning environments that utilize an industrial fabrication processes approach,

-Support further development of new training methodologies in combination with pedagogical implementation of predictive vivid video solutions demonstrating How to DO and How Not to DO working procedures.

Do-IT is disseminating a new innovative approach for in-company training by offering VET schools and mechanical industry companies access to an integrated pedagogical training and learning approach, and new iPod Touch technology.

However, manufacturing industry in Romania demands a large number of new quality professionals. "Petru Maior" University of Tirgu Mures (UPM) will, due to lack of personnel in the Quality Assurance (QA) sector, provide a new education for Chamber of Commerce Industry and Agriculture of Mures County (CCIAMS), in quality auditors courses accredited by National Council for Adult Vocational Training.

This education focuses on QA aspects at the engineering level and QA skills upgrading of workers

in the various manufacturing sectors in Romania.

2. Do-IT project aims and objectives

Do-IT is aiming at disseminating and raising the awareness of a new integrated blended learning environment that offers flexible and pedagogical delivery of level specific mechanical industry production process training to VET schools and in-company training organizations in Romania. This includes:
• Educate VET QA instructors as Activity Based Training learning environment advisers,
• Disseminate an innovative transfer system for SME in-company training that is delivered on a just-in-time basis.

Do-IT utilizes blended learning methods that mix and merge: i) A pedagogical model that utilizes ABT to follow the production flow of an object, ii) onsite training, ii) self paced on-line education, and iv) high quality instructional video delivery of learning material to welding institutes, SME and VET schools, into one competence transfer model.

The Do-IT actions include: i) Dissemination of the new ABT training principles for effective transfer of competence in companies, institutes and VET schools, ii) Dissemination and delivery of an instructor training program (e.g. good practises) targeting design, development and implementation of the learning environment tools for QA trainers. iii) Delivery of flexible training courses to manufacturing industry companies for dissemination of the learning environment, training methodologies, and sound inclusion of instructional video into skills upgrading. iv) Transfer of expert knowledge and good practises to stakeholders at national and European level.

The new learning environment and the ABT model close the traditional gap between VET training and the industrial production process workflow. The methods are generic, whereby they are applicable to European wide manufacturing industry sectors (fabrication industries, VET schools and SME's). They facilitate an innovative solution for cost- and time effective transfer of industrial production process know-how and technology knowledge to SME at a just-in-time basis.

The Do-IT learning approach for QA training is completely new in Romania and represents the implementation of the modern learning tool in QA processes. It is necessary to train trainers in order to be familiar with new learning methodology, which brings a new classroom environment for the students. From the sectorial perspective, Do-IT disseminates and exploits activities targeting quality professionals, like quality managers and quality auditors from enterprises, that are providing QA training according to standards like ISO 9000, 9001 as 9004, 19011 (auditing) and application in industry. Thus, Do-IT covers all QA educational paths.

The Do-IT training methodologies and technical solutions also target other QA guidelines aiming of influencing similar educational routes. In this way Do-IT includes most of the sectorial educational paths within the QA sector.

From the geographical perspective, Do-IT targets central educational needs by offering institutes, VET schools and industry itself access to flexible just-on-time on-the-job training activities that are independent of distance limitations. Furthermore, it targets teachers and QA instructors thus stimulating a life-long learning process through a dedicated train-the-trainer programme. This programme has a dual purpose by stimulating new teachers and instructors to apply technologies that enhance their professional reputation and their technological curiosity, as well as offering them an educational path for upgrading of their knowledge.

From other perspective, UPM may disseminate the project results through their membership in the European Distance Education Network that includes most countries in Europe. Extension of new harmonised guidelines in combination with an educational framework targeting train-the-trainer, stimulate the cooperation and exchange of trainers between institutes, VET schools and industry. Thus, the Do-IT dissemination and exploitation activities enhance the Lisbon strategy for free movement of personnel due to the harmonised educational framework for skills upgrading processes targeting welders and mechanical industry.

It should be noticed that Do-IT uses international recognized diplomas and certification of QA personnel, which strengthen and promote free movement of personnel and skilled workers within the member states.

Very few initiatives in the industrial sector have targeted this challenging problem in such an integrated and pedagogical sound way by identifying quality criteria, defining methods of learning needs, develop provider specific measures and services, identify new skills for teachers and training personnel, and finally disseminate and validate the selected training principles/solutions through a number of in-company training courses. It is expected that the project to stimulate new implementation of know-how transfer in companies, and increase the use of new training principles.

Do-IT utilizes blended learning methods that mix and merge [6]: i) A pedagogical model that utilizes ABT to follow the industrial production flow of an object, while at the same time always following up theoretical training with practical training, ii) onsite training, ii) self paced on-line education, and iv) high quality instructional video delivery of learning material to institutes, SME and VET schools, into one competence transfer model.

The new learning environment and the ABT model close the traditional gap between VET training and the industrial production process workflow. The methods are generic, whereby they are applicable to European wide mechanical industry sectors

(fabrication industries, VET schools and SME's).

The evaluation measures focus on the effectiveness of the learning environment as a solution that engages students demand for obtaining theoretical competence and knowledge. The course delivery is a two tire implementation:

• Delivery of the instructor training courses to VET schools, with pilot use of the prototype as the first activity. This partly consist of seminars highlighting the structure and methodology obtained through the MECCA project [8] and focusing on the relevant findings for this market

• After the first training seminars for the target group teachers and instructors, then the practical courses from this group are offered and implemented as a second activity for the ultimate target group QA specialists in industrial companies. The starting point is a pilot course for testing the translated educational material and the ABT methodology. Second a planned educational schedule is defined together with the teachers and instructors from the first schedule. This schedule is developed at a national level but with additional coordination on a regional level.

3. ABT methodology

The MECCA project [8] developed and validated an innovative new learning environment that utilizes a new pedagogical methodology (ABT), in a new competence transfer model by combining on-site training, e-learning, instructional video on demand solutions, high quality videoconferencing.

ABT focuses on delivering theoretical content just in front of the practical training tasks, linking directly theory and practice according to the industrial production path of an object [3]. ABT create relevance and motivate the student, triggering ultimately reflective cognition processes. By using such a model in combination with the technical video solutions, it is possible to transfer education, competence and know-how on a just-in-time on-the-job basis in a lifelong learning perspective.

The core idea behind ABT [2] is that student should produce something. This something can be a variety of things, from a physical product like iron to services in a restaurant. The production process must be clearly defined so that each step in the process represents an added value to the process itself. The production process consists of a number of defined production steps, each adding a value to the product. These steps can be described with a scope, purpose and a time schedule.

However the start point for any production is that it contains an order, defined as a set of documents clearly describing the product which shall be produced. For example the following documents should be attached to the order: design drawings, manufacturing drawings, final assembly drawings, functional description of the product, delivery requirements including requirement for documentation, list of raw materials, quality requirements for raw materials and final product, delivery plan for the product, requirements for qualifications of the personnel, documentation control and traceability, etc.

ABT learning environment is offering flexible and sound pedagogical delivery of level specific manufacturing industry production process training to VET schools and SME training organizations in Romania.

To be able to actively participate in collaborative creation of knowledge objects, students are expected to take control of their learning, and to engage in productive collaboration with peers.

Do-IT project disseminates new methods for delivering in-company skills upgrading processes that significantly reduces the costs related to competence and knowledge transfer, and enhances production competence and know-how transfer to VET schools. This includes:

• Educate VET QA instructors as Activity Based Training learning environment advisers

• Disseminate an innovative transfer system for in-company QA training of personnel, delivered on a just-in-time basis without distance limitations with inclusion of iPOD Touch student response system.

Participating training institutes, VET schools and companies may utilize the new ABT learning environment to offer a broad range of specialized courses at a European level.

ABT courses are structured in a number of job orders, each containing a number of job packages, that improve knowledge and competence transfer according to a just-in-time on-the-job production workflow approach [4].

The results from the MECCA projects demonstrated that welder students, who usually are not interested in theoretical explanations, started to request more theoretical training in their education. This is quite extraordinary and demonstrates that the principles of delivering the theory just-in-front of practical training and according to the production line are important [5].

Coordinated use of highly focused industrial instructional video: they demonstrate how to do and (even more important) how not to do various welding techniques. They may serve as a starting point for discussions, thus trigging QA reflective cognition processes.

4. ABT application in VET of quality auditors

ABT methodology has been used in the quality auditors courses delivered by UPM and CCIAMS. For this purpose, have been used 13 modules that are presented in table 1. Some of them are theoretical (modules 1, 3, 5, 9) and others are practical (modules 2, 4, 6-8, 10-12). A module consists of 2 lectures, each lasting about 50 minutes.

Table 1. The ABT methodology for quality management system audit course according to ISO 19011 and ISO 9001. Evaluation of theoretical achievements with SRS

Module no	Quality audit process - ABT activities	Verification and control process - ABT activities	Type of module	SRS evalua-tion
1. Introduction in the QA course	Introduction to the QA course, scope of the education in quality	Organization	Theo-retical	13 questions
2. Contracting the audit	Delivery of contractual documents including domain and criteria of audit	Contract review Establish the criteria for audit	Practical	-
3. Establishing the audit team	Nomination of chief auditor, selection of auditors	Qualification of auditors, Criteria for chief auditor	Theo-retical	11 questions
4. Analysis of quality management system documentation	Analysis of ● Quality manual, ● System procedures, ● Operational procedures	Degree of fulfilment of audit criteria	Practical	-
5.Audit planning and execution	Knowledge of audit documents, main steps for planning and execution	Degree of organisational comprising in the audit process	Theo-retical	15 questions
6. Elaboration of documents for audit	Creating the: ● Audit plan, ● Audit questioner, ● Nonconformities report, ● Process sheet ● Audit report	Control of documents format according to ISO 9001, ISO 19011 and system documentation	Practical	-
7. Audit planning	Elaboration and delivery of audit plan – agreements between auditors and audited organization	Control of audit plan according to organisational chart and system documentation	Practical	-
8. Audit execution	Examination of organization, filling ● Audit questioner, ● Nonconformities report	Control and verification before, during and after audit – control of proofs supporting nonconformities	Practical	-
9.Audit report and follow up corrections	Knowledge of audit reporting activities and implementation of corrections	Report mechanism	Theo-retical	14 questions
10. Audit report elaboration	Filling the audit report and delivery to the audited organisation	Control of conclusions in the audit report	Practical	-
11. Corrections	Establish corrections, corrective actions	Evaluation of envisioned efficiency of corrective actions	Practical	-
12. Follow corrections and corrective actions	Evaluation of corrections and corrective actions	Control of documents supporting corrections and corrective actions. Evaluation of efficiency and efficacy of proposed corrective actions	Practical	-
13. Appreciation of the Quality Audit ABT course and SRS evaluation	Participants list at the course Evaluation questioner		Evalu-ation	

The testing of the theoretical and practical achievements have been done using SRS methodology, depicted in figure 1, how students are using the voting system and in figure 2, is shown the display of the results on a smartboard.

Fig. 1 - Students voting on iPods
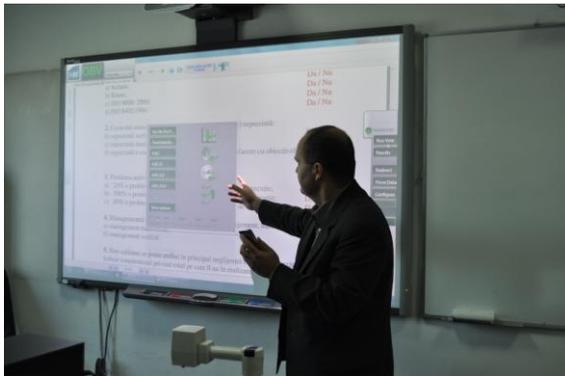
Fig. 2 - Results display in a SRS session

At the end of the course have been distributed questioners to the course participants (module 13). The results together with interviews with students show a clear positive picture on using the ABT during the class. Students agree that the ABT encourage the students to be active during the lecture, and they feel that using ABT helps them to learn the curriculum of the course.

The personal benefit of the students after participating at the courses was very good, also the courseware and the instructor were very good and they totally agree the relevance of the ABT methodology in the future.

5. Discussion and conclusions

Sør-Trøndelag University College of Trondheim in Norway is coordinator of the project "Disseminating Open and Innovative Tools and Services for Vocational Education and Training in Quality Assurance" (acronym Do-IT), financed by European Commission, having partner "Petru Maior" University of Tîrgu Mureş [7]. During the project we have employed the Activity Based Training in a few VET courses delivered for quality auditors.

ABT courses are structured in a number of job orders presented in 13 modules, some of them theoretical and some practical, each containing a number of job packages, that improve knowledge and competence transfer according to a just-in-time on-the-job production workflow approach.

The students provide positive feedback with respect to increased engagement and motivation. Many students feel it become very motivated to attend the lectures.

Pedagogical challenges related to the new roles of the teacher and the students in the educational process have been demonstrated. Experiences from the first testing period of the ABT system have provided valuable information targeting challenges, as well as "best practices" for using such systems in large classrooms.

6. Acknowledgement

References

[1] Moldovan, L. *Design and Development of Innovative Tools and Models for E-Learning in Central and Western Romania*. The 6th International *Seminar* QMHE2010, Tulcea, Romania. 2010. Book II (pp. 543-546).

[2] Moldovan L., John Birger Stav. *Activity Based Training Employed in Quality Assurance Training.* Scientific Bulletin of the "Petru Maior" University of Tîrgu-Mureş , vol. 8 (XXV), no. 1, 2011, ISSN 1841-9267, pag. 77-81.

[3] Moldovan L., John Birger Stav. *Open And Innovative Tools And Services For Vocational Education And Training In Quality Assurance*. Scientific Bulletin of the "Petru Maior" University of Tîrgu-Mureş , vol. 8 (XXV), no. 1, 2011, ISSN 1841-9267, pag. 83-88.

[4] J. B. Stav, E. Engh, R. Bergh - *New Models for Just-in-Time Transfer of Skills and Knowledge to SME*, Proceedings from the CELDA 2007 conference, Algarve, Portugal, 2007.

[5] J. B. Stav - *Experiences with activity based training methods in vocational education*, Proceedings from the IASTED international Conference Computers and Advanced Technologies in Education, Crete, Greece, September 29–October 1, 2008.

[6] J. B. Stav, E. Engh - *Experiences with High Quality Video Services in Teaching, Learning and Skills Upgrading*, Proceedings from On-Line Educa, Berlin, 2009.

[7] Project Do-IT, online http://histproject.no/node/97

[8] Project Mecca, online at http://prosjekt.hist.no/mecca/