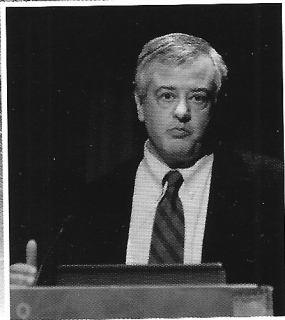


A CASE STUDY of WORK-BASED LEARNING USING E-LEARNING



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An example of using E-learning tools and strategies to train engineers and supervisors. The case study was one of the initiatives undertaken in a Leonardo project coordinated by Aalborg University in Denmark.

In the definition of Work Based Learning (WBL) the Learner is learning from its workplace. It is learning without attending formal designated courses or displacing to a specific location. It has generally a purpose of improving its competences abridging knowledge, skills or attitudes. It may aim at obtaining credits and, in certain cases, to accumulate towards a degree. It is possible to have academic assessment in WBL whenever recognition and accreditation are involved. In general the evaluation of the WBL is done by the employer or by professional organizations.

WBL implies the goal of acquiring new competences, and the correct specification of learning objectives is difficult. The definition of learning methods is also complicated and is designed for each case due to the diversity of initial and final learning scenarios. Another important phase, that tries to alleviate the previously stated difficulties, is the outlining of milestones and tasks for the learner during the process. It is also convenient and useful to define the success

criteria of the process established by the employer and by the employee. The company involvement, as an interested partner, is necessary along the whole process: analysis, negotiation, implementation and evaluation. The role of university is crucial to provide the academic and scientific content and to assist in the definition of the pedagogic methods and techniques.

A usual procedure is to establish a **Learning Contract** to be signed by the employee, by the company and by the trainer provider, typically a university in the context of continuing professional development (CPD) of engineers. The contract provides a system to integrate the WBL in the work situations. The WBL does not imply the work place or family at specific times due to the training. The contract is also a guarantee of professional relevance and may be integrated in the organizational learning.

The contents of the WBL, the size of the learning content and the speed of administration of the package may be individually adapted to fit the needs of the employee and of the company. Concerning the university it is a good opportunity of transfer of research-based knowledge to industry and to public organizations in effective and diversified ways. It can support the small businesses towards innovation and provide graduates with entrepreneurial skills.

A toolkit of CPD using WBL can be designed to provide novel

training for Engineers. It may be implemented through tacit and explicit knowledge transfer, training of knowledge-based skills and acquisition of specific organizational attitudes. WBL for CDP of engineers may be provided by university staff to deliver an explicit discipline or multidisciplinary subjects to enhance creativity and innovation of participants. Generally, the initial tools are:

- The **Learning Needs Analysis Tool** to assess strengths and weaknesses of the organization and its staff.
- A **Development of Reflective Practice Tool** to support individuals in understanding the value of reflective practice.
- A **Learning Set and Working Styles Tool** to create group of trusting individuals and examine different working styles. These tools are followed by a **Learning Development Tool** that encourages positive problem solving by identifying real and imagined barriers. The tools used to provide training are **Tacit Knowledge Tool** that underlines the value of tacit knowledge and its integration with explicit knowledge, the **Action Development Tool** with a logical development of activity plans, a **Learning Development Agreement Tool** (contract) to prepare the learning agreement based on tacit, explicit and knowledge-based skills for the organization and a **Professional Development Tool** to allow individuals to agree individual-based competencies to be acquired at the end of the process.

E-learning is a possibility of WBL for engineers and the case study presented is related to training of Safety in Construction. Target groups were engineers and supervisors of SME. The WBL support using E-learning was provided by the University of Porto.

MATERIALS

The materials used were supported by a CD-Rom (Ebook), a Learning Management Platform (Moodle) and a web portal. The CD-Rom was composed of legislation, guides, management techniques and videos. It was designed as a mixture of text with hyperlinks and a fruitful navigation menu allowing rapid and precise access to what was needed. The Learning Management Platform was a repository of articles, research papers, forum for discussion, schedule and other learning material. It worked mostly as the asynchronous communication tool between trainees and trainers. The portal was a public site with links to other related sites, events, public learning materials and access to official authorities.

GOALS

The goals of the WBL of the case study were:

- Provide online and on time support to training about specific subjects of Safety Construction
- Give specialized training for supervisors and engineers as planned in the learning contract.

As explained before, the tools of the WBL toolkit were all addressed with emphasis on some characteristics of the E-learning approach. For instance the needs analysis and development of the learning plan were those who occupied more time in the process. The definition of the training for engineers and supervisors needed global meetings with presentations and sector meetings to identify the needs. The learning plan was also difficult and lengthy due to the diversity of the training subjects and to the busy schedule of the trainees.



PROCESS

The process was evaluated by five workers and by an external expert. The external expert concentrated on the learning objects based on the expertise of E-learning projects from the program funded by the European Commission (Continuing Engineering Education as WBL 2003-DK/03/B/F/PP-145311). The five workers were three supervisors and two engineers that evaluated the WBL based on their experience versus the learning objectives established in the learning contracts.

EVALUATION

The external expert from Sweden evaluated that the learning object addresses the issue of safety on construction sites, illustrating the risks and hazards present on construction sites, including safety precaution measures, safety checks and First Aid procedures. It was useful to recognize hazardous procedures, to understand the importance of precautionary measures, to identify protective equipment and to correctly apply preventive measures. He stated that each of these modules comprised a series of pages containing animated pictures, text and spoken commentary, that within the modules, the pages can be followed in sequence. He mentioned graphics were well designed and caught the attention of the learner. He mentioned that navigation around the modules was intuitive and easy. As there was no indication as to any sequence that should be followed and the student was free to move to any of the nine modules at any time. He also stated that there was a variation in the approach adopted in the different modules. In conclusion, the development of this learning object was a good first step to the production of a commercially viable blended learning program for training employees on construction safety.

The three supervisors commented that the schedule of access was in accordance with the site work plan. The training was used by all relevant workers and real scenes were successfully replaced by interactive drawings. The materials also promoted encouragement of analysis and comments by users facilitating the direct application on site. The evaluation made by the two engineers underlined the importance of E-learning applied to safety in the construction process. They also suggested the use of the training materials to facilitate the recording and analysis of the accidents in Construction. They underlined the value of the formative action using the WBL approach. The engineers stated the usefulness of handling the training materials on site, which it allowed quick and exact answers to practical questions.

CONCLUSION

It can be concluded that users and external expert considered WBL based on E-learning an effective and useful technique to address training on the job. It has no attachments to schedule and is based on a needs demand created by the implementation of the construction plan or by the occurrence of unexpected situations. Potentially it combines the advantages of WBL and of E-learning. With the development of E-learning tools and training materials, the future of WBL may involve a larger component of this type of training. This is particularly possible if WBL tools are properly managed.

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CASO DE ESTUDO DE "GESTÃO DA SEGURANÇA NA CONSTRUÇÃO"

(Alfredo Soeiro)

1. IDENTIFICAÇÃO DA DISCIPLINA

Nome: Gestão da Segurança na Construção
Disciplina obrigatória do 9º Mestrado em Construção de Edifícios
Semestral: 1º semestre

Plataforma: WebCT

N.º Alunos: 19

Equipa docente: Dr. Alfredo Soeiro e com o apoio da Dra. Rita Falcão no uso da plataforma WebCT.

2. CONTEXTUALIZAÇÃO

• Descrição da disciplina

Os objectivos da disciplina são a definição dos metas a atingir na segurança na construção de edifícios, a análise e a escolha das ferramentas de implementação da segurança e as opções dos sistemas de gestão da segurança na construção.

• Estratégias de ensino adoptadas antes de integrar o Projecto E-learningUP|2003

A estratégia de ensino adoptada era a tradicional com aulas presenciais de exposição oral e apresentação de diapositivos.

• Descrição da utilização das TIC antes de integrar este projecto, incluindo informação e materiais *on-line* já existente

Não havia nenhuma utilização.

• Dados estatísticos de anos anteriores relativos à disciplina

Em 2000/1 não houve edição desta cadeira. Em 2002/3 houve 19 alunos inscritos, 15 alunos submetidos ao primeiro exame, 13 aprovações no exame inicial e 4 aprovações no exame de recurso.

3. MOTIVAÇÃO

• Motivação para aderir ao projecto

Tratando-se duma cadeira de mestrado havia muitos alunos que não estavam presentes nas aulas devido aos afazeres profissionais. A utilização do WebCT pretendeu ajudar estes alunos a aceder aos materiais das aulas e aos elementos de estudo. Por outro lado tentava-se avaliar se a utilização do WebCT era eficiente e eficaz na aprendizagem.

• Expectativas iniciais

As expectativas iniciais eram reduzidas à facilitação de acesso aos elementos das aulas. A possibilidade