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R8 [TASK 3.1]

REPORT ON PROJECT-BASED TRAINING

English version

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Olimpius ISTRATE, Simona VELEA
TEHNE- Centre for Innovation in Education
2011



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1. INTRODUCTION

Education and training systems are gradually changing their options and defining new education policies in the light of recent experiences that have proved their viability, on one hand, and as a result of the development of learning theories based on new epistemological assumptions and hypothetical constructions about the cognitive-emotional development.

Thus, the orientation towards attitudes and values associated with the profession or with the professional training routes, the specificity of the content taken from the areas of knowledge, as well as the features of the target group, the tempo of the instructional path and the context of the training course define the conceptual framework in which the current curriculum is defined, implemented and evaluated. As a leitmotif, the practicality, the applicability and the significance (cultural and/ or professional) of the targeted contents and behaviors remain in the constant attention of education policy makers at the national and institutional level or in a field of study. Also, the profile of potential students and the set of skills of graduates generate, through a *backwash effect*, a series of benchmarks for options regarding training methodology, assessment tools and strategies, and training delivery method. Interactive methods are gradually gaining ground amid the general trends of use of the constructivist and cognitivist approaches in education, to optimize learners competences. On the other hand, approaches such as online training or *blended learning* rather prove as being the effects of a specific request from the audience than the results of an opportunity analysis regarding the curriculum. However, various experiences with notable results, reported in research reports and scientific studies, range the ICT-assisted training in a horizon of expectations characterized by efficiency and quality in education/ training. Extraordinary potential of ICT, grafted on the trend of an approach to learning through a suite of curriculum sequences (learning objects), indicates a possible way forward both for the reorganization of educational situations and for a rethinking of training pathways. In addition, the transformation of training institutions into learning organizations brings the "project" in the foreground within a double perspective: on the one hand as a model of institutional organization based on cyclical, parallel processes, oriented toward a well defined goal and with its own dynamic, integrated in the management system of the organization, and on the other hand as a priority methodological option across the instructional strategies used in the training of beneficiaries.

RENOVA project (A knowledge transfer and framework construction for nursing staff across Europe to develop professional skills as managers) introduces such changes trying to deduct and to propose a modern curriculum based on learning through projects, applied in a sensitive area: (re)training of a category of medical staff.



2. PROJECT-BASED LEARNING

The method of project based learning is a holistic, integrative approach within the education process, that allows and fosters understanding of the phenomena, a long-term retention of knowledge, and development of higher order thinking skills, through involvement of learners in concrete and significant activities, most often with interdisciplinary extensions, in which they contribute, collaborate, engage. In the learning situation, the participants call upon prior knowledge and similar experiences, taking advantage of them in a new context, very close to reality.

Project-based learning approach means organizing training course around one or more projects. Synthetically, the projects:

- are complex tasks, which have as a starting point a problematic situation or challenge, often circumscribed by a number of suggestions, rules or norms for achievement;
- give participants the opportunity to work relatively independently on long periods of time;
- end with concrete, realistic, applicable products or presentations.

2.1. Specific features

In project-based training, participants are in the center of the learning process, engage in a long-term study of subjects in the curriculum, make connections between what they learn and the real world, collaborate, participate to decision, and use a variety of evaluation methods throughout the project. Some specific features of a project-based learning situate it among the effective methods, usable in various contexts or training areas, as well as within some current paradigm of constructivist or cognitivist type:

Involvement. Participants are involved in learning, are motivated and consider the results obtained as relevant.

Autonomy. Participants develop competences that help them monitor their learning so that they do not have to rely on a trainer to conduct them.

Applicability. In the projects, participants learn through exploration, apply what they learn and demonstrate their knowledge at the end of the training sequence.

Connections with the real world. During the project, participants can perform a variety of specific tasks specific to the real world, the results of their work being applicable in concrete situations. The work in a project often takes participants outside the training room and can also involve collaboration with professionals/ practitioners of that field.



Support the development of key skills. Project activity favors the development of key skills such as critical thinking, problem solving, decision making and creativity.

Project-based learning has many benefits for participants in training:

Increased motivation. In project-based learning approach, a growing presence in activities and improved attitude to learning has been observed from all participants. Trainers who use the method say that project participants are often willing to do extra work on a project. (Thomas, 2000)

Better learning. Those who use project-based learning have results as good or better than those obtained in other models, also assuming more responsibility for their learning when working on a project than with traditional learning activities. (Boaler, 1999, SRI, 2000)

Better higher order thinking skills. Project-based learning offers participants opportunities to develop complex thinking skills such as problem solving and decision-making. In a project, the participants raise and solve complex issues and make important decisions. (SRI, 2000, Thomas, 1998)

More collaboration. Many projects depend on the participants group work. Cognitive theories suggest that learning is a social phenomenon and participants learn more in a collaborative medium such as the one generated by involvement in a project situation. (Wiburg, 1994)

Increased autonomy. Work on the project requires participants' involvement in complex tasks that help them develop organizational skills, time management and autonomy. (Thomas, 2000)

Benefits for all participants. Those who benefit most from project-based learning methods are the participants for whom traditional approaches are not effective (SRI, 2000). In project-based learning, individuals that were previously disinterested begin to participate in activities. Access to a wide variety of training opportunities in the training room is a strategy for involving participants with different cognitive levels and from diverse socioeconomic and cultural environments. (Railsback, 2002).

2.2. Links to current trends in education and training

Project-based learning is linked to other theories, approaches and methods from the education sciences domain, such as constructivism, inquiry-based learning, problem based learning, interdisciplinarity.

Constructivism is a theory based on how people learn. People build their own understanding and knowledge of the world through experience and reflection. In training, participants actively learn by doing, for example, experimenting and solving specific problems of the real world. They reflect on how their understanding changes and discuss



about it. Project-based learning, inquiry-based learning and problem-based learning are rooted in constructivist theory. It is considered that the project-based learning is a constructivist approach to learning. Participants work on projects or open problems. Learning is focused on the participant, the trainer acting as facilitator. Participants usually work in groups, working on a longer period of time, searching multiple sources of information and creating authentic products.

Inquiry-based learning begins with gathering information and data. Through this process of investigation, participants build their understanding on a "need or desire to know." Investigation involves the search for appropriate solutions to questions or problems through specific skills/ competences. Although investigative skills are often used in project-based learning, the inquiry-based learning does not always implies the existence of a project.

Problem-based learning is another constructivist approach to learning. It is a training strategy used to engage participants in authentic tasks, specific to the "real world". The trainer has a specific and complex problem, and, by using the investigation, participants come up with a solution to the problem. Although project-based learning and problem-based learning are similar, problem-based learning may not include all the components of a project.

The premise of the **interdisciplinary approach** to the content of learning is to ensure unity of knowledge and overcome the boundaries of the fields of study. It is widely accepted that in everyday life we do not use knowledge gained from disparate disciplines and we do not capitalize certain specific attributes of study-matters. Integrated approach to knowledge is not a novelty, pedagogists have been stressing the importance of knowledge transfer as a whole since the ancient Greeks. Our life is a complex and unitary one, so we should study the phenomenon from the perspective of different disciplines, interrelated and, moreover, in terms of capitalization of non-formal and informal learning within a formal context.

Pedagogical literature offers several modern methodological solutions: multidisciplinary and thematic approach, interdisciplinary and integrated approach, cross-curricular approach.

Interdisciplinary perspective facilitates the shaping of „a unified picture of reality" and the development of "integrative thinking". Interdisciplinary correlations are logical links between fields of study, meaning that explaining a phenomenon requests information studied from different disciplines and methods. They can be spontaneous or planned and can be linked to the definition of concepts/ terms, the use of methods or tools in new contexts, the transfer of values and the formation of attitudes through different disciplines.

One of the most appropriate method for an interdisciplinary approach is the project based learning method.



2.3. Practical aspects of the project-based learning method

The project is a way of organizing a complex learning/ training activity, which requires a longer period of time (one or more weeks). It is a method of pragmatic valences considering its orientation towards a final product. Projects leverages two seemingly antagonistic elements: the individual effort of learning and the cooperative learning.

The PBL method occurred in early 20th Century, due to the need for flexibility and social relevance of the curriculum and as a means of equalizing opportunities. It requires students to make the plan of activities in the classroom or outside, under the supervision of the trainer, starting with identifying a problem. It can be done individually or in groups. It is a complex method because it integrates, in its turn, other training methods or techniques. Students look for information, process it, formulate problems and seek solutions, evaluate options, decisions, etc. All these activities exploit information and specific capacities of several areas of knowledge. The PBL method is "very effective especially for interdisciplinary subjects, precisely because, by nature of the tasks it proposes, it requests the transfer of knowledge and skills acquired in other disciplines, and highlights the cross skills (transversal skills) such as communication, negotiation, planning, organization. It is very important in this method that the student becomes a real partner in making decisions and having the opportunity for free initiative in development of the project."

Organizing a group project brings many benefits. Individual peculiarities require organizing activities in small groups, where tasks can be individualized and performance or progress can be easily measured. Reciprocal learning is an effective type of learning but usually less valued, which occurs in the context of learning in small groups and in carrying out projects.

Suggestions for the use of project method

- establishing project objectives and deliverables / products expected;
- choosing the theme and sub-themes;
- organizing students - individually or in groups - and establishing everyone's set of tasks;
- establishing the sequences of the project, the duration and timing;
- identifying necessary resources (information and materials);
- establishing procedures for monitoring the activity of each student;
- establishment of assessment methods (to evaluate the products or both, to evaluate individual students or the work group)

Roles of the trainer

- coordinates activities of groups or individual students;



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- supervises compliance with deadlines, assess tasks performed by students or by groups of students;
- evaluates, together with students, the project results and/ or products obtained and the value added by this project.

Advantages

- facilitates an integrated approach to learning; redeems a rich, interdisciplinary and relevant content on a particular topic;
- exploits different capacities and skills of students, allowing all students to get involved in various activities, suitable for their interests;
- enables diversification of teaching and learning activities by involving students in research, exploration, investigation, discussion, information synthesis, production of new information, etc.;
- fosters a sense of individual and group responsibility to achieve a collective final product.

Limitations/ Precautions

- Sometimes the PBL method is time-consuming. Through an efficient design, this disadvantage can be overcome.
- There must be provided conditions in order that all students participate in activities, and to assume equal responsibility on the project.

3. THE SPECIFICS OF ADULT LEARNING

Adult learning – a relatively recent studied domain - has been frequently analyzed in terms of differences from children learning, the similarities between the two processes being most often ignored. American Professor Malcolm Knowles had a major contribution to shaping the field of adult education as research fields and in the popularization of adult learning characteristics, such as:

- independence and motivation in learning: adults need a different guidance, a non-directive one, they need support; their motivation is intrinsic and related mainly to the profession;
- the need to link learning with the experience and the prior knowledge of learners; learning is not predominantly a process of accumulation, but a restructuring one, a development and generalization, and students feel the need



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to relate theories and concepts with their own experience that they want to exploit;

- learning oriented to a goal: adults want to know very clearly and right from the beginning why and for what they are taking a course;
- relevance of learning: adults seek to understand the applicability of knowledge and the value of what they learn in terms of their social or professional life; in the case of project-based training, students can choose topics according to their interests and needs;
- pragmatism: adults find and select the most relevant and useful aspects/ knowledge/ skills;
- the need to be respected and for their experience to be recognized (and from this perspective the project method is very adequate as it allows students to highlight and exploit their own knowledge and experience).

Based on these main characteristics of the learning process for adults, some techniques can be extracted in order to facilitate the learning by using the PBT method:

1. identification, valuation and use of the previous personal experience (project not only allows, but should even be based on previous experience);
2. treat students with respect and create an environment based on trust and cooperation – aspects favored by the work in small groups and the role of facilitator or organizer that the trainer mainly has when using this method;
3. orientation of the training towards practical solutions and clear goals, relevant to the profession of the participants (students are involved in management of the training process);
4. encouraging reflection on their experiences and extracting "lessons";
5. involve students in activities by ensuring the relevance of the content, by designing their own tasks, by fostering the exchange of experience, collaboration and small groups work;
6. students motivation (motivation changes their behavior, increases their attention, it stimulates and guides their learning).

Modern methods in adult education are considered essentially experimental, requiring personal effort and active participation.

There are also issues that may slow the adult learning process and the training through projects:

- previous experience - often an asset in adult education it may nevertheless lead to reverse consequences due to the "already know" sensation or the effects of previous failures in learning (the feeling that the training does not help, that is theoretical and not applicable, that it does not justify the time spent, that it is difficult and will not meet the requirements etc.);



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- misconception that learning is specific to early ages and not to adults is sometimes a way to mask the fear of not cope with new requests for training, especially the fear of new technologies;
- lack of motivation, feeling that training will not bring benefits to match the investments;
- fear that their image could be affected, that could be perceived differently by others and judged on their performance in the training process;
- lack of exercise to learn, to work in groups, to collaborate.

4. LEARNING THROUGH PROJECTS IN VIRTUAL ENVIRONMENTS

The transfer of the project based learning method in the training programs with an online training component proved to be a suitable strategy as far as the design of the curriculum combined the correct tools and innovative methods to allow the traditional use of the facilities offered by the virtual environment and a thorough learning by focusing content and orientation on learning outcomes. Research shows that well-known and tested training techniques must be further kept and used and the applications with higher degree of novelty must intervene only if justified in terms of teaching. Focusing on technology is both a temptation and a tendency both at the level of the training conceivers and among participants, but balancing the excess/ abuse of technology starting from the design phase of the training platform allows a balanced use and a focus on learning.

Some experiences summarized in evaluation studies and reports reveal a simplistic use of training systems based on web technologies (WBT - Web-based training) and the ignorance of recent theoretical science education guidelines (Helicos 2005). Authors' suggestion and solution is to design integrated WBT systems that equally support different actual learning paradigms. The argument is that the purpose of these training programs delivered online or in the mixed system (*blended learning*) is to improve training by replacing or supplementing traditional methods in an attempt to increase the performance of participants measured at the end of the program. In this perspective, the approach of the training project should go through two phases: transposition of existing training and learning practices in a model for use in virtual space (electronic/ digital format), then finding those ways to deliver content and interaction that are specific to the online environment and that bring added value to the training sessions. The premise - which is perfectly valid and consistently mentioned among the advantages of using new technologies in education and training - is that the new ICT should be a catalyst for the innovative, interesting and effective training experience.



4.1. Common Problems

The identification of the problems and learning difficulties associated with the project based method was subject of a meta-analysis conducted in 2000 (Thomas 2000, cited Helicos 2005), and most of the issues highlighted can be transferred in using the project-based training in the virtual environment. With regards to training participants, they do not have difficulties in generating detailed project blueprint and going through the project steps, but they have problems in managing the time allocated and systematically fail to address the tasks of the process due to the lack of exercise in implementing projects. Also, they find it difficult to efficiently use the data collected during the project. For example, participants tend to draw conclusions based on information from external sources, rather than directly use their results and interpreting them, even though they would serve their goals better. It is the role of trainers to help them anticipate more realistically the complexity and the time required for each stage, through discussions and adjustments in the project development phase, resulting in a better project management. In addition, trainers should indicate on the map what are the most interesting data obtained from the investigations of the project, directing the participants to conclusions based on logic and evidence. Web tools that support the project method in a virtual environment incorporate sufficient variants that the trainer can use to monitor ongoing investigations and provide feedback whenever needed.

On the other hand, several common problems were identified and were also encountered by trainers (Marx et al 1997, cited Helicos 2005). First, the management of the group of trainees is more difficult in the context of project based training approach; in the management of learning, for example, it is difficult to establish from the beginning the proportions between independent work and work with tutorial support in a balance that would be valid for all types of the projects chosen by the participants. Second, inadequate feedback from the trainer can create serious problems to participants; in the cases analyzed, the trainers did not provide enough support during the development of the project, which has led to mismanagement of projects and to unsatisfactory results. In the virtual environment, there is the same need for appropriate tools for quick support in learning and/or investigations during the project, along with the imperative to adequately design the entire virtual environment in accordance with the purpose and type of training.

4.2. Requirements for virtual learning using project based method

Project-based learning was the focus of specific concerns that have followed the development of web tools for education and training. Among the most known are CaMILE and CSILE.



CaMILE (Collaborative and Multimedia Interactive Learning Environment) used the procedural facilitation (concept developed by Scardamalia and Bereiter in 1984) and included facilities for effective collaboration (Kehoe 1997). Procedural facilitation involves the announcement of the role of individual participants in the collaborative group, also suggesting the reaction models in a dialogue. The first version of the platform was developed for Macintosh, afterwards other options for web modules have been built to support *anchored collaboration*, with the help of which comments of the participants could be linked to any context or situation of the platform, through one simple click, leading to increased collaborative activities in the working groups.

CSILE is a tool developed as a result of explicitly formulated recommendations for the requirements of the projects design, particularly those which result in assumptions about the content of training. CSILE consists of a *computer-supported intentional learning environment* designed to support students with difficulties in formulating key questions and developing the project investigations.

But neither of the two instruments provides facilities for project management: the ability to make plans for projects or project phases calendars, effective ways to present projects, etc. (Helicos 2005). Consequently, a number of requirements for virtual environments approaching project based training are formulated as follows:

Support for project management. Trainers should be able to develop curriculum in the form of a project plan. Each plan consists of a sequence of steps that participants must go through to achieve the final goal. Each stage can be described by a number of actions. The plan must include a schedule of activities that establish also the timeline. Granularity of the project phases and the activities timeline must be adjusted depending on the cognitive level of the participants and their preferences and degree of familiarity with the technologies used in the program. For example, the trainer must be able to define several stages of a project if participants need more support along the way, in order to break the process of creating the final product into several sub-stages (each with concrete results, measurable and observable) that can be discussed to improve the process.

Participants are in the center of training. During the project based training sessions, participants must be offered support in achieving learning through various methods and techniques: prompt feedback at all stages of planning and project development, supporting their motivation, offering them examples/ counter-examples, alternatives, additional resources and reflection themes adapted to the project theme and the difficulties of the project, providing tools for communication as well as development and reviewing tools of the products they create together. Also, it is important to avoid "technology abuse" and any restrictive applications and tools as well as to offer a technological environment able to integrate file formats that are widely used: documents published in the most common word processors, HTML, PDF, spreadsheets, presentations etc.

Support for collaboration. Both the communication between participants and the communication between trainers and participants must take place as a normal act, using tools similar to previous experiences of the trainees. The most common examples of ways of



communication in the virtual environment are the forum and chat types, designed for asynchronous, and respectively synchronous communication. Communication tools should allow the opening of private sessions or discussion spaces for collaborative work in groups accessible only to the members of a working group engaged with the same project. As collaborative tools associated with these activities, facilities such wiki/ collaborative online documents must be included as they allow simultaneous editing of the same document. Additionally, you can use web-meeting applications such as Adobe Connect or Dim Dim for virtual training sessions, seminars or colloquia with the entire group.

Support for monitoring participants. In order to monitor and assess progress in learning throughout the course of projects, trainers should have easy access to the desktop of each project and to the documents being edited and uploaded by the participants. There are also some useful tools for monitoring access such as participation checklists, statistics on the number of hits and time spent on the categories of resources as well as track changes facilities for the collaborative documents developed by learners.

5. PROJECT BASED LEARNING INTEGRATION EXPERIENCES

The project based learning method is increasingly used both in formal and non-formal learning contexts, including specific types of training programs such as blended learning or exclusively online. Collaborative and extended work tasks, targeting the solving of real problems are considered a learning experience that trainers are calling upon to give significance and sustainability to the learning process, to give students the opportunity to explore complex issues, to realize practical and reinforce theoretical concepts as well as the specific language of that knowledge domain.

5.1 Curriculum for innovation management – Ireland

The Department of Industrial Engineering of the National University of Ireland initiated in 2002 a combined curriculum for a course on "Innovation Management" (O'Sullivan 2003). A series of methods and approaches such as learning through projects, case studies, online seminars and face-to-face lectures were used throughout the academic year for enrolled master students. In this course, emphasis was shifted from descriptions of institutional processes and models of management theory on how to manage effective innovation in the organization. Thus, topics such as "Strategic Planning" and "Performance Evaluation" were addressed through collaborative projects in groups of students, and the end result was presented by each team in a portfolio consisting mostly of the documents, presentations, records of observations on realistic situations in an organization more or less



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fictional. Pedagogical approach was focused on three aspects: seminars, tasks and assessment, each associated with a number of elements (O'Sullivan 2003: 112):

- seminars: keynote seminar, slides seminar, course notes
- work tasks: online advisory, application group, online case studies, classroom presentations, tutorial group, online benchmarking
- assessment: online assessment, individual oral assessment, classroom assessment, written assessment.

The seminar part had the role of "transfer of information" to the students: opening discussion sessions for the participants and stimulate their interest for the new topics discovered during training. Tasks consisted of a series of punctual requirements applicative projects that the students had to manage in groups of maximum three. The projects had to be built on the students experience and the challenge for them was to compare or to associate their results and decisions with the theoretical information received during seminars. The evaluation was used to assess the work carried out by each individual and in team.

Presentations (seminar slides) during the seminars are electronic versions of the presentations used by trainers in thematic seminars. An important feature of the online learning environment is the possibility for trainers use to attach presentations using their regular Internet browser, thus eliminating the server management modules. Lecture notes of seminars consist of a detailed set of notes that include complete information about each topic, including:

- learning outcomes
- bibliographical sources
- course materials
- Q & A/ Summary
- controversial (problematic) situations and themes for reflection

Multimedia elements were not included - participants were encouraged to seek and explore online resources and websites that offer a variety of materials in various formats. The technology used for the lecture notes was Adobe "eBook", which includes features like "Copy" and "Paste", automatic conversion of a text in audio format using Windows 2000. Author of the study note that these facilities were important because they offered the possibility for students to download materials and read them later at their own pace, without being conditioned by access to the Internet.

The online assessment involves periodically the examiner in assessing learners' and/ or online working groups progress and it consists of a "virtual tour" of each task and scoring it when completed. Evaluation criteria include compliance with the deadlines, accuracy and precision of the task approach as well as reporting to a methodology for assessing and validating projects and case studies. Five criteria are specified in the methodology: internal logic (consistency of the information contained in the project/ case study), truth (the project presents a real phenomenon), acceptance, applicability, novelty value (O'Sullivan 2003: 113).



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The online environment for work tasks has two major components: portal and individual tasks. The trainer and the students access and develop their activity products, they also have access to the products of their colleagues activity via the online portal. The application for individual tasks can only be used online, anytime, anywhere, it's secured and does not require installing any additional applications. The platform used is Domino Server and Lotus Developer.

The task portal allows students the access to their colleagues' progress and stimulates inter-evaluation. Various accessories and features such as sorting according to date of last editing and feedback offered by the trainer are useful in the assessment and grading the uploaded or compiled online materials.

The feedback received from the beneficiaries about this online course was entirely positive, among the strengths they have considered being the easy access is to resources and activities, a well structured content, the practicality of themes and tools used in the proposed work tasks.



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This project has been funded with support from the European Commission. This paper reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein