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# Learning Know-How through a Method using Technologies of Information and Communication and Project-Based Learning : the MAETIC Project

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**Abstract:** The following communication treats training of professional practices. Among the ways of teaching, we wish to formalize a method of training to "know-how", based on a collaborative project pedagogy. In this context, we initiated the MAETIC project which aims at setting up MAETIC method (Method of Learning which uses Technologies of Information and Communication). MAETIC is a method of training to "know-how" which comprises three levels of abstraction. It proposes, in its deeper level, the "Student' E-case" bound for the students and the "Teacher' E-case " bound for the teachers. In this article, we present the context and the objectives of MAETIC project. We describe then the genesis of this project. We present then the experimentation carried out on the " MAETIC-PM Student' E-case " dedicated to Project Management teaching. We finish with a preliminary analysis of the results and with prospects which it opens.

## Introduction

Within the framework of the learning of professional practices, the formalized knowledge is important. The education covers then, theoretical knowledge but also practical experiences of ground. Furthermore, it could be noticed that the transmission of know-how in the professional contexts is often incompatible with a formal training. Moreover, a big number of vocational trainings includes, in their program, the realization, by their learners, of collective projects. However, a certain number of publications advances the difficulty in teaching the Project Management with pedagogies of traditional type (Potteck 2003). In this context, new manners of teaching are then envisaged and experimented and among these the project-based pedagogy ( Baker & al. 2000), (Newman & al. 2003) has interested us.

The project-based pedagogy aims to succeed, by means of a teamwork, in the acquisition of competences. The learner is confronted with the organization of its own activity and with that of the group. This type of pedagogy

arises from the socio-constructivism. Socio-constructivism takes place in the domain of the active pedagogy (Georges & Leroux 2001). It offers an alternative to the traditional pedagogy. The learner builds his knowledge by means of projects, identifies and formulates its own problems (Blumenfeld & al. 1991). The project-based learning is then a model of learning organized around the project (Thomas 2000). A complex task based on a question or a problem is to be resolved. It implies the students in activities of conception, problem solving, decision-taking, or investigation. It ends by a "product" and a presentation.

The MAETIC ("Méthode d'Apprentissage instrumentée par les TIC" is a French acronym which means "Method of learning using Information and Communication Technologies") project takes place in this research context. It takes place in the center of vocational trainings and integrates collective educational scenarios based on project. It is also supported by an hybrid mode of education (presence and distance). The aimed devices support the training of know how, and more specifically the training of project management.

The first part of this communication presents the MAETIC research project and its genesis. In a second part, will be detailed the experiment made in an ecological environment, in two vocational trainings of the higher education for the learning of project management. Then we conclude through a first analysis of experiment results.

## **The MAETIC Project**

The objective of this section is to present the genesis of the MAETIC project and the instrumentation of a learning method applied to a context dedicated to project management teaching.

### **Genesis of the MAETIC project**

In 2001, the MEPULCO group (Université du Littoral Côte d'Opale : ULCO) proposed a method to assist students' projects. It is made up of a "project kit" given to the students and an "assistance guide" given to the teachers to follow projects (Talon & al. 2006). The writing of these "guides" comes from the observation of a lack on the ground. It concerned the organization of the follow-up of the students' projects in the IUT of Calais. The MEPULCO method was issued of the practices of members (teachers) of the group.

During year 2004, further to a collaboration between the MUTICE group of the Université de Picardie Jules Verne (UPJV) and the MEPULCO group, the MEPULCO method was restructured. Indeed, group MEPULCO-MUTICE wished "to transform" a method of ground practices, into the formalization of a methodology of Project Management teaching. The group wanted to instrument this methodology with the Information and Communication Technologies for the Education. A first work was then to define a use case : a learning method dedicated to Project Management and intended for the university. So, the method was named "Guide Mepulco-Université (MEPULCO-University Guide)". A second work consisted in decomposing the method into a student booklet and a teaching booklet.

The authors of this communication brought then to a research problem of an elaboration of a "generic" method. It allows the learning of " knowledge " using a project-based pedagogy : the MAETIC method. The elaboration of this generic method is the object of the MAETIC project described in the following section.

### **The MAETIC Project**

The MAETIC project joins in an incremental method of search action, which allows :

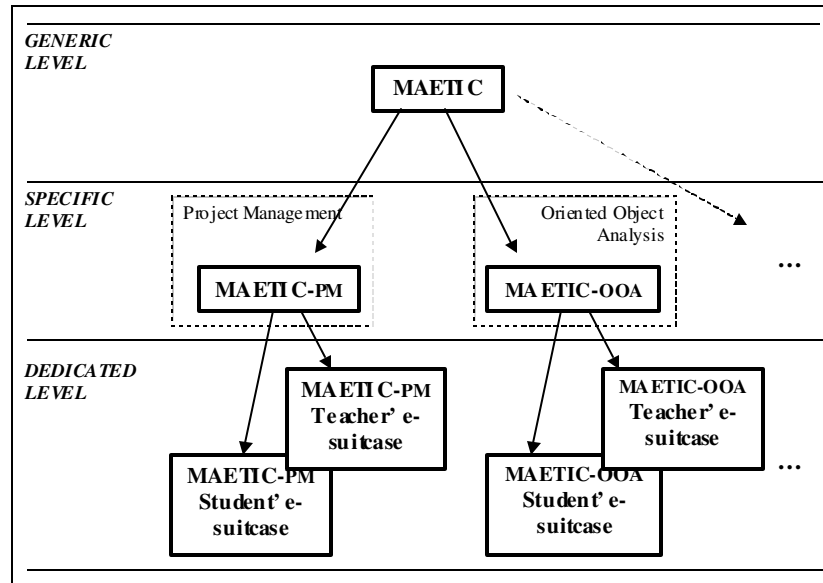
- The elaboration and the instrumentation of the MAETIC method,
- The declension of this method on various types of know-how and various domains of learning,
- The experiments in ecological environment with different publics of students,
- The analysis of the experimental material and the enrichment of the MAETIC method.

The object of this research is the production of tools for the organization and the instrumentation of project-based learning. The concerned competences are know-how. The types of envisaged know-how concerned the following domains: project management, object orientated analysis, training plans, communication plans.

As the (fig. 1) below shows, there are three levels of abstraction in the MAETIC method. The level 1

(*generic level*) includes the knowledge independent from the type of know-how taught and from the domain of learning. It includes the knowledge common to the organization of a project-based learning. The context of aimed learning is both a remotely and in presence education.

The level 2 (*specific level*) includes the knowledge dependent of the taught know-how and of the domain of learning. For example, MAETIC-PM is the declension of MAETIC for the learning of the Project Management, as (fig. 1) represents below.



**Figure 1** : Model of MAETIC method : variations according to types of know-how.

Finally, the level 3 (*instrumented level*) is a " instantiation " of the specific level with a student part and a teaching part. Each of these parts are then instrumented by CIT and are called e-suitcase. These are then supplied to teachers to allow them to manage their students during the training. For example, in MAETIC-PM, the student part is called the " MAETIC-PM Student' e-suitcase " and the teaching part is called " MAETIC-PM Teacher' e-suitcase ". Also, every specific declension of MAETIC will contain a " Student' e-suitcase " instrumentation and a "Teacher' e-suitcase " instrumentation.

It is important to underline that the proof of the genericity of the MAETIC method, its conception, and its formalization, join a long-term research. At the present time, we propose this division in levels, following on observations and collections of information stemming from our grounds practices (ULCO and UPJV). Furthermore, the design method, adopted in this research project, is an "ethno-participative" design methodology (Lecllet 2004). This design methodology is also described in this conference. The title of the submission is "An "ethno-participative" Method for E-Learning Environments Design : Experiment in Project Management Training".

We were first interested in the training of know-how in the domain of Project Management. It is due to the experience of the authors, specialized in the project management teaching. We began then in elaborating and instrumenting the " MAETIC-PM Student' e-suitcase ". In this context, we isolated what was specific to the learning of the Project Management, and what seemed to us generic and independent from any type of know-how. We separated then the appropriated knowledge for the " generic level " and these that is dependent of the " specific level " of the MAETIC method.

The " MAETIC-PM Student' e-suitcase " was then experimented on various groups of students during the first half of the academic year 2005-2006. The collected material of these experiments is now going to allow us to enrich the " MAETIC-PM Student' e-suitcase ", the MAETIC-PM, and the MAETIC method itself. We shall also describe the knowledge of the " MAETIC-PM Teacher' e-suitcase ". This " Teacher' e-suitcase " will then be tested, in ecological situation, for the second half of the year 2005-2006, with teachers who are partners of the project. Naturally this second experiment will allow us, again, to enrich MAETIC-PM and MAETIC. This same incremental process will then be applied to the learning of know-how centered on the object analysis.

Let us see now, in the following section, the instrumentation and the experiments of the " MAETIC-PM Student' e-suitcase".

## Experiments of the MAETIC-PM Student' E-suitcase

It is important to underline that our objectives is to instrument our learning device with existing tools, intuitively usable, without computing competencies.

### Student Part Instrumentation

Force is to notice that teachers have real difficulties to create educational scenarios instrumented by the CIT (Pernin & Lejeune on 2004). Tools are often unsuitable for teachers who wish to organize this kind of training in their courses. For example, the platforms for opened training are too complex to be integrated by a teacher without any assistance (AS-Plate-form Group 2005). Furthermore, the lack of technical competence and sometimes of time also discourages teachers.

Moreover, on Web, numerous easy tools, like Blogs, exist and can be used in an educational context (BLOG AMUE 2006). Also, numerous research works propose tools dedicated to teachers who aim to help teachers to manage numerical courses (Paquette 2004). For example the NetUniversité portal (Trigano & Giacomini-Pecurar, 2004) seems relevant to us to propose methods which allows setting up easy learning environments with instrumentation of such a simple and available tools. This tool, which helps to the conception of educational Web sites, is based on educational scenarios described in IMS Learning Design (Koper & Tattersall 2005). It helps teachers (or educational designers), having no technical competences, to conceive their educational Web sites.

So, in a first time, D. Lecléthas instrumented the student' part of MAETIC-PM, by using the NetUniversité Web portal. In a second time, Weblog technology has been added (Blood 2000). It allows the students to hold a Weblog of the project and to communicate information to teachers and to other members of the group. This technology was also chosen thanks to its handiness. Furthermore, it allows to create a social link between the students and seems to facilitate the writing through posts (Fiedler 2004).

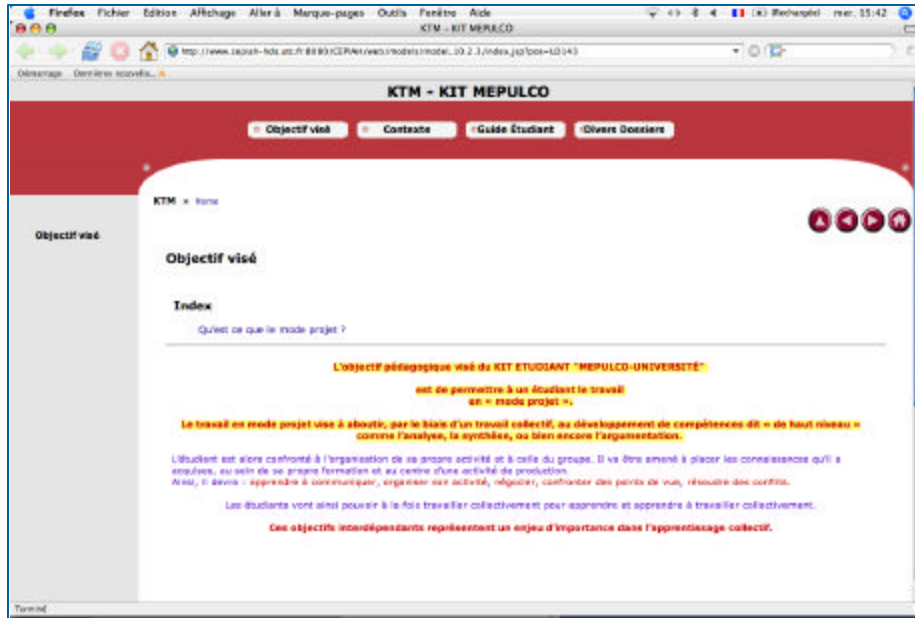
So, the " MAETIC-PM Student' e-suitcase " contains the following elements :

- A Teacher' Weblog, which references the blogs of the students' projects teams.
- An educational NetUniversité resource made of :
  - A homepage, which presents the working context, the aimed educational objective.
  - A graphic charter.
  - A methodological guide for the students (to download).
  - Four "pilot files" and models of documents (to download).

Every student get, with a login and a password, on-line personalized educational resources. When a student connects, the homepage below (fig. 2) displays.

The NetUniversité resource was divided into four chapters : the aimed educational objective, the context, the student guide and different files. In the " aimed objective " chapter, we explain what is a project and a pedagogy in a project mode. In the "context" chapter, we present the working context, the progress of the projects and the educational approach. Finally, both last chapters are intended for the downloading of the various documents. These different documents were elaborated from the works of the MEPULCO-MUTICE group, in a perspective of genericity.

Let us note that the " MAETIC-PM Student' e-suitcase " joins in an educational scenario which aims to set up a project-based pedagogy. So, the progress of the educational activities of the students was defined during the first working session, in classroom. A planning of the sessions was also proposed to the students.



**Figure 2 :** Homepage of the " MAETIC-PM Student' e-suitcase ".

Let us see now the protocol of experiment.

### Protocol of experiment

The underlying hypothesis, in this experiment, is the following one: *"The paper guide used by the students, which is included in the " MAETIC-PM Student' e-suitcase ", brings a methodological framework which allows them to follow a rigorous method to achieve collectively a project"*.

So, to counter or confirm this hypothesis, a protocol of experiment was defined. This protocol consists of: a participating observation of teachers during sessions ; a collection of activity reports sent at the issue of every session ; a collection of the posts of the student on Weblog ; an individual questionnaire distributed to each student at the end of the module ; semi-directive conversations with each group of students, one month after the exam.

The target population was divided into two promotions. The first one consisted of students of MASTER I MIAGE (Computer Methods Applied to the Management of Companies) registered on the faculty of Mathematics and Data processing of the UPJV. This training takes place in an alternation mode (one week at university and one week on companies). The education corresponded to the Educational Unity called " M1-MIAGE.7.35 - Project Management". The promotion contained 63 students, divided into two groups among which a witness group. The second promotion concerned students of MASTER II IFA (Engineering for Adults training) of the department of Education Science of the faculty of Philosophy Human and social Sciences of the UPJV. The education corresponded to the Educational Unity called " M5 - training driven by project". The promotion contained 19 students.

Concerning the questionnaire, eight sets of themes were retained : meetings; external sources; documents; collaborative work; roles within the team; role of the teacher; the Weblog and the NetUniversité portal. The questionnaire was sent by e-mail. Currently, 52 questionnaires on 63 were returned for Master I MIAGE and 19 questionnaires on 19 for Master II IFA. The semi-directive conversations were made from March 20th till March 24th, 2006. The seizure of questionnaires under the SPYNHX software (a software dedicated de statistic management) is in progress. The analysis is foreseen until summer. As it was underlined in the section 2, the results of this analysis will allow us to enrich MAETIC.

Let us see in the following section the first analysis and conclusions.

## First Analysis and Conclusion

As we signalled it previously, the analysis of the questionnaires and interviews are in progress. We can however give some exploratory results of analysis.

First of all, we can underline the attractive aspect, for the students, of the setting up of a pedagogy by project. They put an incentive, of which they specify forward that it doesn't only come from the grade, but merely of the pleasure to provide a product of quality. The formation, offered under an hybrid format (in presence and from afar), offered them the possibility to meet during sessions. These sessions became quickly, to their eyes, sessions of meetings during which they could sum up their project.

The students appreciated the setting up of the blog as log book for their project. They underlined the possibility of centralization of the information offered by this tool, as well as its easiness of use. Certain students of the witness group have developed a blog while it was not asked. They have as a whole brought a big harshness to the compilation documentary and they took as a starting point the graphic charter of the "Student' e-suitcase " to produce their own charter. They globally exploited the available documents models but less the pilot files. In fact, certain files seems, in their opinion, too " loaded ".

The preliminary results of analysis will have evidently to be refined in the coming months. And, notably the good organization of the students, thanks to the e-suitcase, will have to be verified. The return on usage should allow us to develop the method in its 3 levels. The " MAETIC " method, to his more generic level (specific level), notably, should see an evolution of the educational scenario. "MAETIC-PM " (generic level), will evolve, with an updated knowledge, for an improved apprenticeship of the project management. The " MAETIC-PM Student' e-suitcase " (dedicated level) should take charge of the observations linked to the usage of the method. Notably there are difficulties due to a non-permanent availability of Internet for certain students as well as to their mobility. The analysis of the results should equally give us some tracks to develop the " Teacher' e-suitcase ", notably on the position of the teacher during training sessions with a charge of checking the advancement of the project and managing the conflicts. To longer term, we envision the development of a " MAETIC-OOA " method in order to validate the genericity of the model.

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