

# COUPLING A DATABASE WITH QUIZZES, A MODEL FOR ELEARNING APPLICATIONS?

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## Abstract

This paper describes the benefits of associating an online image database taken from a specific course with quizzes. This association can be seen as a model to conceive e-learning applications since it is reusable for many courses. For example, the model can be applied when the student has to work with images to prepare an exam. Our experiments are based on three courses (bachelor or master course level) that teach how to identify monuments, clothing (in antiquity), types of ancient writing (in codicology) and alpine or medicinal plants (in botany).

## Keywords

e-learning tools, higher education, database, moodle, quizzes, images, technology, PHP/MySQL, Flash

## 1. INTRODUCTION

Hybrid courses are particularly important today (Charlier, Peraya, & Deschryver, 2006) [6] and internet can add interactions between teachers and learners. Courses and teaching methods require constant improvements and must also be adjusted to deal with classes having complex learning objectives. Traditional pedagogical supports such as blackboard, textbooks, transparencies and videos are well complemented by computer-based e-learning tools, allowing teaching to take place in a more polyvalent and motivating educational environment.

For these reasons, we decided to develop a type of e-learning tool allowing teachers to answer questions of a student during sessions in presence of a course and students to reach documents and their notes at any time. One main advantage is that these tools can be used remotely and can be adapted to each student: differentiation of the rate/rhythm and knowledge level [13]. It allows them to prepare their exams in an autonomous way, testing their progresses over the academic year.

In the present study, we focus on how we conceived an e-learning tool that associates an online image database coupled with interactive quizzes. Learning with such tools may be innovative and beneficial for learners if they allow a large variety of interactive features such as browsing in details into an image, selecting an images' list adapted to a specific course, linking images and textual notice or storing student exercise results. As working on similar e-learning tools for different courses in the fields of codicology, archaeology and botany, we thought about a model. It seems to be adapted to different projects and is composed of a database, coupled exercises and a management tool.

## 2. TECHNOLOGICAL ASPECTS

Many computer languages can be used to develop such applications. We chose PHP [4,8,9,10] as computer language to develop the online management tool that allows teachers to update a MySQL database [9]. This language allows autonomous applications, but also especially client-server applications to be developed. The server-side is used in order to generate automatically lists of images, adapted to each student and course, and to manage the database. For the exercises part, we initially chose to use the Flash [1,2,3] technology because it allows the use of very light animations adapted to the Web and offers a great portability on operating systems. After three months of tests with students and teachers, we noted that our model was well accepted and operational, but that Flash was not suitable for the creation of exercises, since it requires many human resources and its results were too specific to a given exercise.

Therefore we tested another solution: the Moodle platform [7] (LMS already used for the courses management of the University of Fribourg). Its test function allows lists of opened questions to be proposed and feedbacks to be automated. Thanks to Moodle, teachers benefit from a quickly development and a fast adaptation of their exercises in an autonomous way. An additional tool for Moodle, called "img\_zoom", was also programmed.

This is a very elaborate Flash [11,12,17] application, which allows visualizing, navigating and moving dynamically into an image (left and right motions; In and Out zooms) thanks to its integrated radar [Fig.1]. It can be integrated easily into Moodle by copying its source code into an html block, available for the whole community [<http://moodle.unifr.ch/mod/resource/view.php?id=52708>]. This tool motivates students to analyse in details an image on which he works.



(Fig.1. img\_zoom example)

## 3. PEDAGOGICAL ASPECTS

With these exercises, we use the computer for replacing the teacher, one of the three roles seen for applications of computers in teaching [5]. There are learning processes that can be computed in automatic sequences. We are studying how students manage, in autonomy, to memorize facts by using alternatively the database to learn and a quiz to check their learning progresses.

The learner needs to perform a variety of cognitive activities that enable him or her to acquire new knowledge. For example, identifying his/her training needs, searching for additional information, getting feedback on the learning process, getting help from teachers and other learners.

The interactivity [14] of e-learning tools favours these activities. For example, a zoom [Fig.1] (see section 2), encourage students to explore images more closely. This is enhancing the development of a generic skill [15] we can name analysis of a document. Also, automatic feedbacks help students to work by their own. A direct feedback, conceived as an indication on a particular question, helps them on going to the solution. If they are blocked on a question, the correct answer can also be displayed

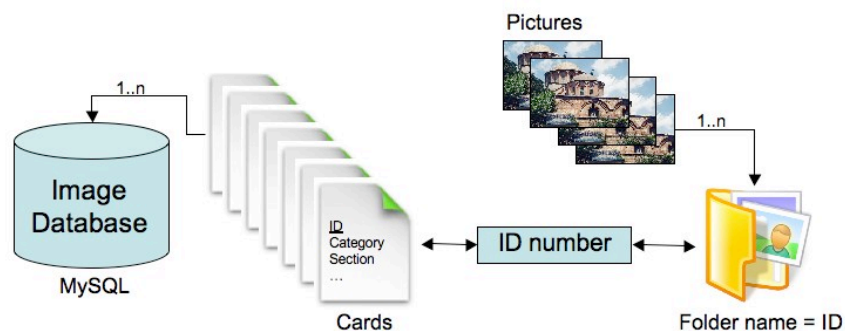
as a feedback. The student can also use the same quiz several times. It is also very interesting to store the results, corrections and feedbacks of an entire quiz, linked to the personal login of the student. At the end of a quiz, it allows the student to check what items of the database he should work again. The students also get this way an historical view of their results, for different essays of the quiz, and this shows his learning progresses.

Other interactive aspects can also be used. Internet search engines are more efficient than those of printed documents. Internet links between the database and the exercise motivate the students for working with the database and the quiz. If they have a poor result on a particular question, a direct link proposes the students to see again the corresponding item in the database. This is similar as when a student reads a hypertext with hyperlinks towards a glossary, a situation that scientists call “enriched reading” [16] where memorisation and understanding of the text are improved.

## 4. MODEL MAIN COMPONENTS

### 4.1 Database

The first step of our study is the creation of the online image database structure [Fig.6]. The database is composed of many cards that contain all the information related to a specific image or a group of images. Each card is composed of a unique ID which depends on which category the image belongs. A folder with the same name is created for each new instance of a card that contains all the images of the card.

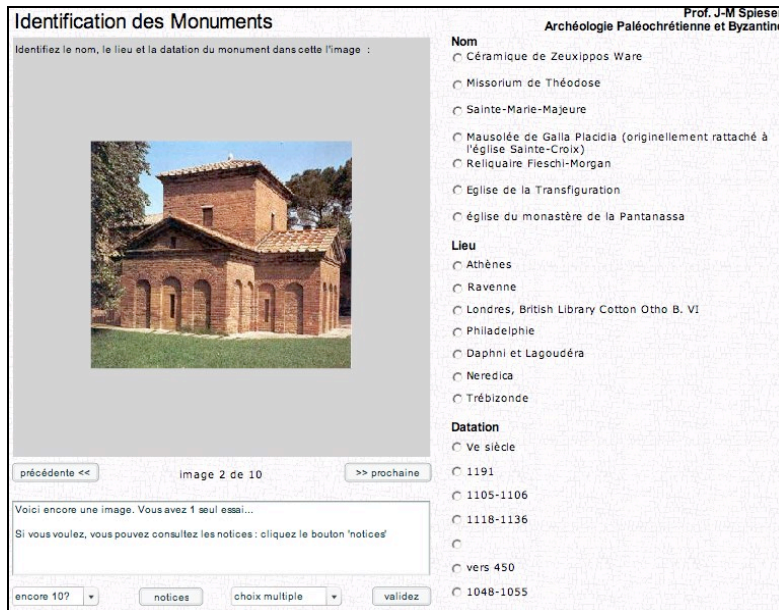


(Fig.2. Database structure)

### 4.2 Exercises

#### Flash

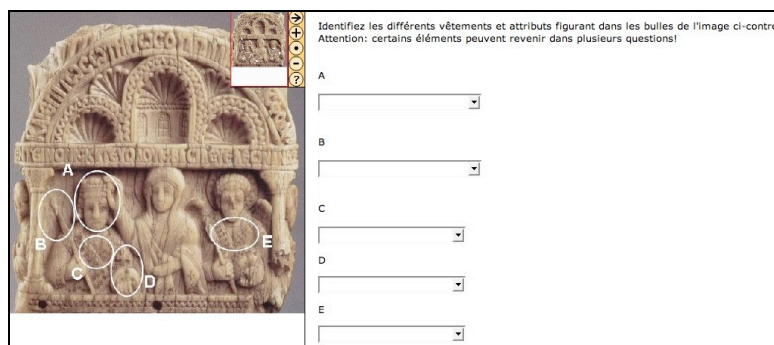
For the exercises part, we initially chose to use the Flash [1,2,3,11,12,17] [Fig.3] technology because allowing the use of very light animations adapted to the Web and offers a great portability on operating systems. After three months of tests with students and teachers, we noted that the exercise was well accepted and operational, but that Flash was not suitable for the creation of such exercises, since it requires many human resources and its results were too specific to a given exercise.



(Fig.3. Flash exercise for the identification of monuments, archaeology course)

## Moodle

Therefore we tested another solution: the Moodle platform [7] (LMS already used for the courses management of the University of Fribourg). Moodle is designed to help educators creating online courses with opportunities for rich interactions and the heart of Moodle is courses that contain activities and resources. There are about 20 different types of activities available (forums, glossaries, wikis, quizzes, choices, databases etc) and each can be customised quite a lot. Its test function allows lists of opened questions to be proposed and feedbacks to be automated. Thanks to Moodle, teachers benefit from a quickly development and a fast adaptation of their exercises [Fig.4] in an autonomous way.

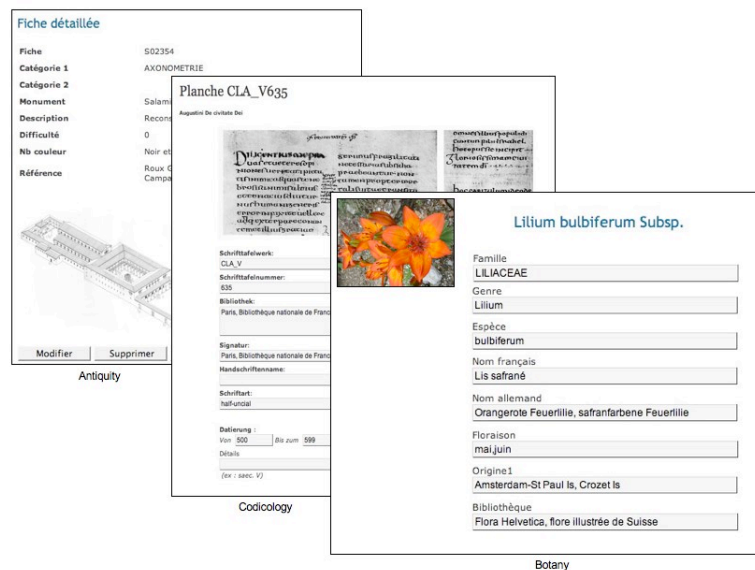


(Fig.4. Moodle quiz for clothes identification, archaeology course)

## 4.3 Management tool

To prepare a course and its associated exercises, an online management tool [Fig.5] has been developed. It first allows teachers updating the database contents in a simple and effective way. For example, a field allows the teacher to establish a hierarchy of the images according to their importance in a specific course and the exercises are then adapted automatically.

Also, the student can choose the main parameter values of the exercise (a new image series, choice of specific course, multiple choice or opened questions, link to database notices) using the interactive boxes linked to the automatic adaptation.



(Fig.5. Examples of three courses using the e-learning tool)

The management tool also contains a powerful search engine that motivates the students for working with the database and the quiz by activating a specific link from the quiz to a precise database card with all its notices.

The server automatically generates the list of images and the feedback type, adapted to the student values and to the teacher's updates. It also manages the paths of the user between the database and the exercises.

## 5. CONCLUSION

The development of this project leads us to the conclusion that, by complementing the learning context with online interactive tools, students may access and manage information more easily. We believe this justifies the development of such e-learning tools, composed of a database and coupled exercises, because they are very useful for the students. Without them, students should look for the images in many different books; constitute the information notices by their own, etc. This is too much work...

Also the management tool brings all the interactive needed functions. Currently, many projects based on the same system indicate us a need from many teachers for a toolbox based on similar "technologies". We therefore plan more and more to make it a model of e-learning tools. We are now further analysing the learning innovative methods that e-learning resources provide, in order to demonstrate their efficiency for students, for an autonomous work aiming at preparing exams.

## 6. ACKNOWLEDGMENT

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