

# A Support Environment for Project-Based Learning Using a Digital Portfolio

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**Abstract:** In Computer-supported Collaborative Learning (CSCL), a bulletin board system (BBS) is ordinarily used as a collaboration media, but if WWW pages are used as presentation media, the discussion site and the presentation site become isolated, so the correspondence between these two resources becomes ambiguous. This paper will describe the environment in which learners can comment and discuss the presentation pages easily. We received positive results from using this system in a course on information literacy at our university.

## Introduction

With the popularization of the Internet, blended learning has increased and, based on student reports, the need for CSCL is rising. Ordinary WWW based learning systems are targeted for self-learning or course management and are not adequate for collaborative learning. In our university, we focused on project-based learning based on blended learning. The following are problems that need to be considered when putting this learning style into practice:

1. How to record the learning process of each learner and the progress of each project.
2. How to hold the learned contents in common with other members and to make discussion using that content.
3. How teachers recognize the progress of each project.
4. How teachers recognize the learning and understanding level of each student.
5. How teachers evaluate and mark each student.
6. How to lessen teachers' burdens.

In order to record and to evaluate the progress of learning, we focused on the digital portfolio (Wing-mui, 2003; Wong, 2003). In this paper we propose a system in which students save their learning record and discuss with other members using a digital portfolio. In this model, teachers also monitor and assess the progress of students using a digital portfolio. We implemented this system (*Zfolio*) using Zope and CMF (Content Management Framework), and have used it in a course on information literacy at our university.

Section 2 will describe the traditional methods and related research. An overview of *Zfolio* will follow in section 3. The usages and evaluation are described in section 4, and our conclusions will comprise section 5.

## Traditional Methods and Related Researches

In project-based learning, each student is assigned a project and they proceed through the project by themselves using various resources and discussing with other students. This is known as a learner-centered learning style. In order to discuss with each other, students are expected to publish their intermediate learning results to other students and discuss with them based on these results. The following methods are traditionally used for this purpose:

1. Students create their own home pages by themselves, update their results, and make a presentation.
2. Using CGI script, related files will be uploaded.
3. Discussion will be entered into using BBSs in which students can attach related files.

These methods have the following problems:

1. It is difficult for non-IT professionals to understand file structure and/or the concept of the server/client system.
2. The discussion site (BBS) and the discussion target (presentation using WWW) are separated.
3. It is difficult for teachers to check updated information, selected information, and overall information.

There is much research and many tools concerning CSCL and portfolio support. BSCW (BSCW) is a shared workspace tool for CSCW. Zebu (Tiessen, 1997) (Ward, 1999) is a groupware environment. CSILE (Computer Supported Intentional Learning Environments) is a collaborative learning environment and functions as a communal database. Fle3 (Fle3) is a learning environment that supports exploration of knowledge between groups. WBLP is a learning portfolio that records, presents, searches, and analyzes the learning process of each student. We summarize the characteristics of these systems in Table 1. Y means yes, N means no, and Y\* means yes but insufficient. Web annotation focuses on the second problem, but its main purpose is not discussion but presentation.

**Table 11: Comparison of functionalities**

Requirement	BSCW	Zebu	CSILE	Fle3	WBLP	Zfolio
Fine grained access right	Y	Y	Y	Y	N	Y*
Portal site conveying the latest information	Y	N	Y	Y	Y	Y*
Easy upload	Y	Y	Y	Y	Y	Y
Management progress of each student	N	N	N	N	N	Y
Monitoring progress of each student	N	N	N	N	Y	Y
Awareness of progress between students	Y	N	Y	Y	N	Y
Notification of events	Y	N	Y	Y	N	N
Integration of discussion sites and target resources	N	N	Y	Y	N	Y*

As shown in Table 1, the characteristics of *Zfolio* are as follows:

1. It is easy to use for students and teachers.
2. Each student can save their work on their own space and recognize their progress with each other.
3. Teachers can see the various views of students' status.
4. Each students can be made aware of other students status.
5. Discussion sites and their target resources are linked.

## System Overview

### Functionalities

In order to resolve the previously mentioned problems, we used Zope and its product CMF. CMF is an application framework for Zope. We used CMF as a construction tool kit for a portal site. By using CMF functions, the following functions can be easily implemented:

1. Authoring function.
2. Commenting function.
3. Access control function.
4. Visualizing and sorting function.

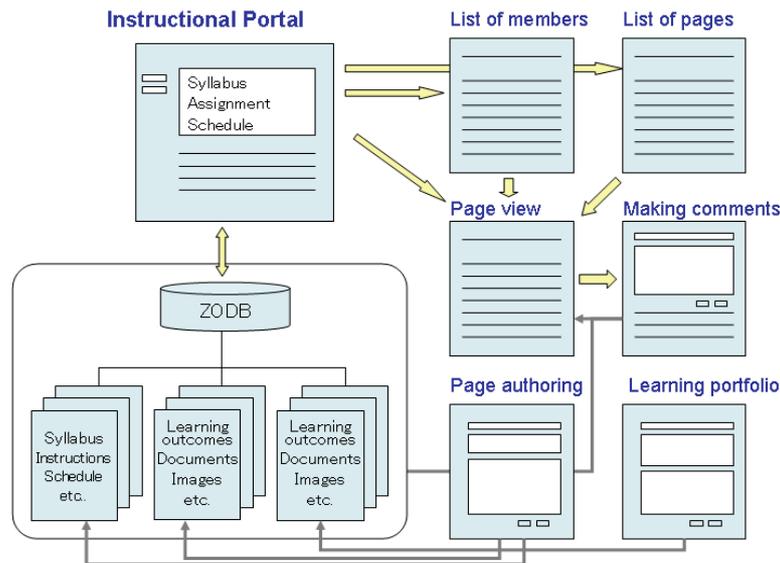


Figure 13: System overview

By using Zope and CMF, we implemented *Zfolio* which has the following functionalities (Figure 1):

1. Portal function

For each user, related information will be presented.

2. Personal page authoring function

Students can make/upload various data files in their own space and set an access control (public and private) in each file.

3. Digital portfolio function

Students can save their daily memos as their personal history.

4. Page commenting function

Students can get comments from other students for the pages that are set to be accessible to others.

5. Page overview function

Teachers/students can see different pages from various points of view.

6. User overview function

Teachers can see summary information of students.

### Usages

Students can do the following task by logging into the portal site of *Zfolio*:

1. Make own WWW page.

2. Upload and manage various files

When users select “My document” button, a file browser for each user is displayed. This is a personal area for each student. By using this browser, they can create new files, edit files, and upload files.

1. Make an entry in a digital portfolio (Figure 2)

When users select the “AddPortfolio” button, a form will be displayed so that users can input their current learning record. If it is the first of that day, a new file will be created, and if it is not the first, the existing file will be used. Users can also look through past portfolios.

2. Read and comment on the other members’ pages

Students can look through project members’ portfolios using various views: ordered by time stamp or organized by each students, and so on.

In addition to these tasks, teachers are able to do the following:

1. Assignment upload function

When teachers save documents in their specific folders then the links to these documents are generated automatically in the top page.

2. Monitor and evaluation function

In order to evaluate students’ records, teachers can see multiple pages in one view, look for pages using various keys, and mark them.



Figure 2: Personal portfolio window

## Experiences and Evaluations

We have used *Zfolio* in the course “Digital Network Information Literacy” at our university for the autumn and winter semesters in 2003. The number of students in each course was 49 and 50. In these courses, students determined their own projects based on a predetermined theme, and did exercises step by step. Students had to do the following tasks until they finished their projects:

1. Personal task

- Goal oriented task and self-evaluation: refine their project into a set of goals, resolve these goals step by step, and evaluate the result.
- Answer to each exercise.

2. Collaboration task

- Hold learning resources in common.
- Discuss with each other.

Teachers and students use *Zfolio* in order to perform the following tasks collaboratively:

- Presentation of the objective and abstract of lectures.
- Presentation of each exercise and their schedule.
- Submission of the answers to exercises.
- Recording of each task in their own space and reviewing them in digital portfolio.

According to the result of the questionnaire survey that was done at the end of the courses, more than half of the students answered that it is easy to use. To the questions about functions such as the page authoring interface, commenting function and page view function, a majority of the students answered that it is useful. We also made a descriptive questionnaire and students answered that it is easier to write something using *Zfolio* than ordinary BBSs, because the digital portfolio on *Zfolio* is one's own space. Some students answered that they don't want their own page open to other students, but it is the advantage of the Zope system that users can change private/published status easily to meet such requirements.

Teachers who use *Zfolio* have the following opinions:

The digital portfolio is very useful because teachers can see the various views of students at a glance, and from this view teachers can infer the various status of students, so specific advice is possible.

Students can upload many unsorted resources freely, so the browsing burden becomes large for teachers. Thus, some criteria or discipline is needed.

The usage of *Zfolio* depends on the objective of lectures. If the objective is IT-oriented, the current structure may be good, but if the objective is not IT-oriented, a more familiar interface will be needed. Adaptive interfaces based on the skill level of teachers/students may be adequate.

## Conclusions

We implemented the portal site system (*Zfolio*) for project based learning using Zope and CMF. *Zfolio* has the digital portfolio function and is easy to use for non-IT professionals. We made it possible to link the discussion and the resource of discussion, which enabled a more effective CSCL environment.

We have used *Zfolio* for one year in IT literacy education. We received positive responses from students and teachers, but they pointed out the following problems:

Some students and/or teachers think that *Zfolio* is still difficult, so improvement of user interface and adaptive interface may be needed.

In some cases, users want to annotate a particular place in their own notes, so WWW annotation may be needed.

Furthermore, some users want to open their resources to some restricted groups, so more flexible access control is needed.

The effectiveness of project based learning style has become clear, so the above improvement makes the adaptation of *Zfolio* to project-based learning easier and as a result, project-based learning may be used more often.

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