Building A Web-Based Learning Portfolio for Authentic Assessment

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Abstract

This paper gives a full and detailed account of the design and development of a web-based learning portfolio (WBLP) system for authentic assessment, in the hope to help record, display, and monitor student learning process. The functions of the WBLP system include portfolio creation, portfolio browse, portfolio guide, portfolio discussion board, portfolio class bulletin, suggestion board, student data maintenance, and system management. Databases used in the WBLP include student portfolio database (including student basic data table, portfolio data table, course work data table), discussion database (including topic data table, article data table), bulletin database (including news data table).

Keywords: *Portfolio, Portfolio Assessment, Electronic Portfolio, Web-Based Portfolio*

Introduction

In response to the needs of the new learning theories such as constructivist learning, and to improve upon the insufficiency and defects of traditional assessments, new assessments come out one after another in various forms and names. The most common assessments in the literature include authentic assessment, performance assessment, and portfolio assessment. Though they have different names, they are designed according to the framework of contemporary teaching theories with emphasis on the cooperation between instruction and assessment, in order to make learning more meaningful and significant. However, among these multidimensional assessments, portfolio assessment has been one of the most often used alternatives. In general, portfolio assessment focuses on the collection of multidimensional data to understand the learning and changes in learners, as well as the stimulation to involvement and self-assessment in learners through the interaction and discussion of the portfolio. Portfolio assessment not only provides true and rich information for reflecting and assessing the true performance and achievement of learners, but also helps students engage in meaningful learning.

Many states and school districts in the USA, such as the State of Vermont and the Pittsburgh school district in Pennsylvania, have already made portfolio compilation the alternative assessment. The ASCD (Association for Supervision and Curriculum Development) of the USA has also considered portfolio assessment as one of the curriculum and instruction reforms in the USA (Vavrus, 1990). It is understood that portfolio assessment has become an important development in US educational reform. In Taiwan however, though research in portfolio assessment is limited, the recent increase in the number of studies and research papers shows that portfolio assessment's value in improving the defects of traditional assessments is affirmative and worth further research and discussion (Chang, 2001).

Tradition portfolio assessment still relies on man-made data collection and a writing-centered learning process. The difficulties in data storage, search and management after long-term implementation have become a problem in the development and implementation of portfolio assessment (Mullin, 1998; Smith & Tillema, 1998; Niguidula, 1993). Information technology is a great aid to data collection, update and management of electronic portfolio (Lankes, 1995). Based upon the above research background and importance concerning learning portfolios, this research designed and constructed a learning portfolio on the World Wide Web architecture according to the portfolio assessment concept by combining the characteristics and functions of computer and network technology. The objectives of the research are: (1)to propose and establish system content and environmental architecture for a web-based learning portfolio. (2)to design and construct a web-based learning portfolio that satisfies the needs of university students in Taiwan.

Model and Techniques of Building WBLP
Model of Building WBLP

The process of our systematically building the WBLP follows the ISD (Dick & Carey, 1997) and ADDIE frameworks that are consisted of analysis, design, development, implementation, and evaluation components. The construction of WBLP is focused on finding out how to incorporate the increasingly powerful Web application and multimedia technologies and content development tools into developing and producing a feasible online learning portfolio, as well as enhancing the system functionalities and performance so as to improve its applicability. A feasible model of systematical building WBLP is based upon our experiences of design and development as well as the evaluation results. This model involves systematic process and tasks of building WBLP. It is observed that effective design and construction of a WBLP can be facilitated through systematic process and prototyping approach. Moreover, integration of ISD and prototyping approach may be employed to find opportunities for establishing a derivative framework for enhancing online portfolio. Internet and multimedia technology

may be applied within the framework of ISD and ADDIE as a systematic approach for building WBLP. In this manner, effective integration of an adaptable ISD approach along with Internet technology may contribute to learning experiences in the current instructional framework.

update and modification. To achieve the above goals, the MS Active Server Page (ASP) was used for the functional development and programming. As it is a server-end script language, which is different from the clients-end script language for execution by the web sever, it is very suitable for data processing of rear-end
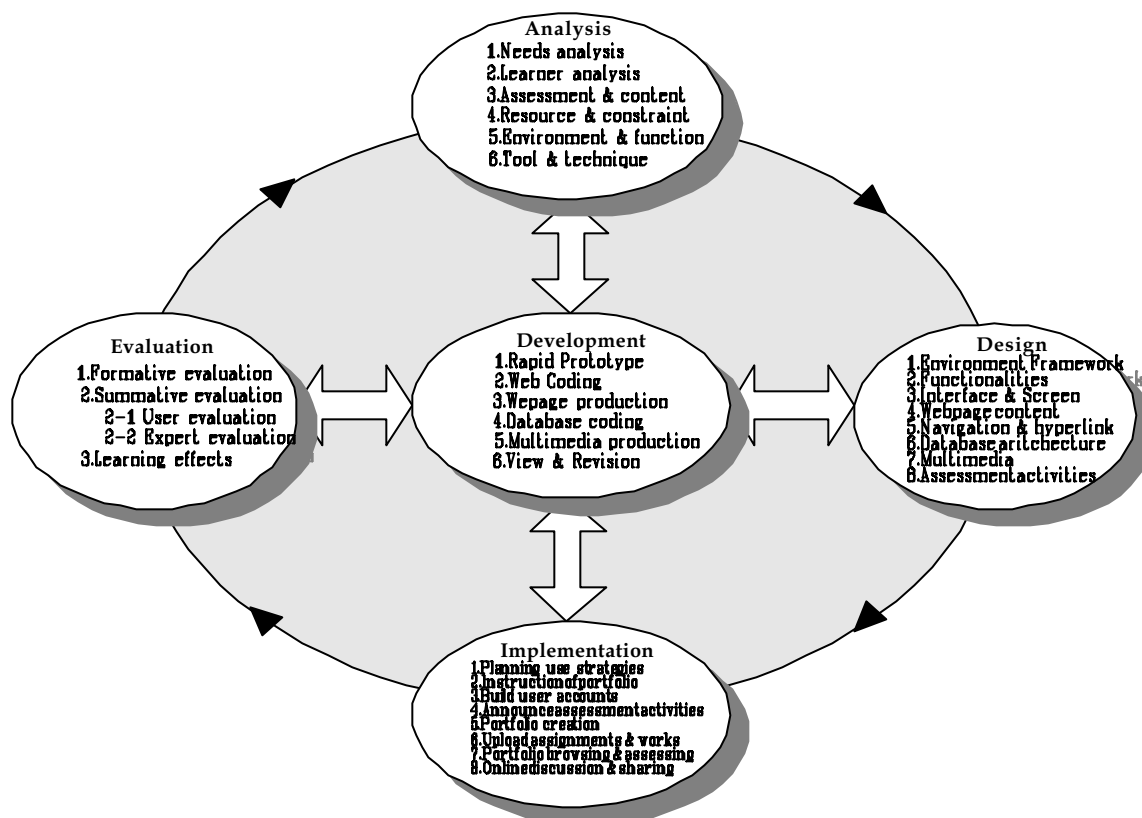

Figure 1. The model of building Web-based learning portfolio

Development Tools and Techniques

The WBLP system is built upon an Intel Pentium-III CPU system and MS Windows NT Server Operation System. The Web server uses the MS Internet Information Server (IIS), and the database uses the MS Access. In addition, MS FrontPage was used to create basic page layout and hyperlink architecture for web pages and MS Visual InterDev was used as an assistant tool for system function development and ASP (Active Server Page) programming. System development and construction were conducted right after the determination of tools (Chang, 2000).

According to the system functional requirements, to enable automatic execution of the specific commands based upon user operations, i.e., real-time, dynamic output of all operational results, and the techniques of active web page were used for the program code. Related database tables were created according to the storage and presentation requirements for system functions and portfolio contents, so that users can access to the latest data and messages and proceed with online

server (e.g., SQL server), and it can transfer the result to the front-end web server in standard HTML, then to the clients-end.

Building and Revising Prototype

The prototyping concept has enabled the system prototype building at the system analysis and design. The aim at this stage is to build a prototype of web-based learning portfolio to execute basic creation and browse functions. First, the overall system architecture was created with MS FrontPage, including page layout, main web page hyperlinks, form/table column design; second, all functions were programmed with the assistant tool of InterDev. The completed functions include basic data maintenance, portfolio creation, portfolio browse, portfolio guide, discussion board, class bulletin, and suggestion board.

Continuous checking and revisions to create a system that satisfy the user demands have been the true spirit of prototyping. Therefore, the WBLP prototype was put online after completion for inspection by students, teachers and experts. Furthermore, we re-analyzed and re-designed the prototype according to

the defects or new requirements found by inspectors, in order to optimize the system. As static data display is used in the prototype, it is less interactive and flexible. Inspectors suggested that some data presentation and form-filling should be more dynamic, such as the function of suggestion board, the system should be able to capture and display the name, e-mail, and user ID from the user basic data, and users should not need to enter their names and ID again. Important revisions to the prototype are as follows:

? User basic data is displayed dynamically in portfolio creation, discussion and suggestion functions.

? Besides user name, portfolio contents (learning goal, work title, reflection/self-assessment, teacher feedback/assessment, peer feedback/assessment, and personal web page) should be enabled as inquiry key for portfolio view.

? System bulletin board announcement and display can be dynamic, i.e., teachers or system manager can post an announcement by filling out a kind of formatted form/table. An additional message database has been added to the system for notice/message storage and management.

? A system management site should be established to enable teachers and the system manager to make user data inquiry, view and update, and to add new user data, including name, account, password and authority assignment.

? User authority assignment should be enabled, the three levels should be teacher/system manager, general user (student taking the course), and guest, to prevent students from modifying the data of other users.

Construction of Functions

The functions of the WBLP system are constructed as follows (Chang, 2000). In *Portfolio creation, t*he WBLP system aims at enabling students to produce their personal learning portfolio fast and easily through the interface provided by the system. Students can complete goal setting, course work upload, reflection and self-assessment record writing, data basic setting and modification, and personal web page upload by filling out the forms. In *Portfolio Browse,* user may inquire or browse any portfolio by student name. Both students and teachers can browse the contents of individual student portfolios. Browsing areas include learning goals, course work, reflection and self-assessment records, teacher feedback, peer feedback, basic data, and personal web page. A user may also inquire/browse any portfolio by works. Both students and teachers can directly browse the contents of the work. Moreover, users may add their feedback and grades while browsing the portfolio.

Portfolio Guide provides information concerning the creation of a learning portfolio, including (1) content selection: contents of portfolio according to teacher requirements or group discussion; (2) assessment criteria: criteria of assessment done by teachers; (3) portfolio creation guide: brief description of rules to be followed for portfolio creation. The contents of this function are subject to adjustment. This function aims at helping students to create their own portfolio. *Portfolio Discussion Board* provides an asynchronous discussion channel for students to discuss things related to the course and the creation of a learning portfolio. The main issues can be: (1) portfolio content selection criteria; (2) portfolio assessment criteria; (2) portfolio creation manner; and (4) course contents: issues relate to the course. *Portfolio Bulletin* provides the latest information and news, including system notice, portfolio activities, course information and news.

Suggestion Board is a communication channel between students and teachers and a system manager to enable students to receive feedback on their problems, opinions and suggestions about the system and portfolio creation. It is also a place for students to share their feelings and experiences about portfolio creation. *Student Data Maintenance* enables students to browse and update/modify their personal data. *System Management* is exclusive for teachers or the system manager to add new user accounts and manage student data, including inquiry, browse, modification, add, and delete student data. In addition, teachers or system manager can directly announce news by filling out the form.

Interface and Navigation

As this WBLP system was designated for university students and teachers, there is no need for excessive icons or colors to attract the adult users. Also, in consideration that most users log onto the system via a modem with limited bandwidth and delivery speed, a function-oriented interface has been designed to facilitate creating and browsing learning portfolio via easily used and articulated form-filling interface. The interface for the entire system is divided into three major frames, the logo is on the head of the screen, system menu on the left to facilitate linking to every function buttons, and the information of individual functions is displayed on the right. Moreover, to avoid window shift confusion, respective contents of each function are displayed in the middle right of the screen. New windows will be opened during course work browse and completion of teacher/peer feedback.

Furthermore, to make portfolio browsing convenient and consistent, DHTML was used in the dynamic hyperlink and browsing design so that users will only need to click the index tag on top to link to the respective text while browsing. Therefore, portfolio contents such as learning goals, course work, reflective and self-assessment record, teacher feedback, peer feedback, basic data, and personal web page can be dynamically displayed in the same page, instead of back and ward clicking and browsing these portfolio contents

Construction of Database

The design of the database is crucial to the smooth

operation of the entire system. Three databases were designed to store and manage students' learning portfolios.

The *portfolio database* is the core section of the WBLP system and the place for storage and management of student learning portfolios. Different application goals (such as supporting multiple courses, different instructors but the same course) of a web-based portfolio lead to various complexity in the considerations of database design. Due to the limits on time and labor, the system presently can simply handle the course load for one class. The student ID number was used as primary index for the portfolio database. The database contains three data tables, which are associated with the student ID.

? Student data table: stores student basic data, e.g., name, ID number, major, interests, and specialty.

? Portfolio data table: stores the contents of student learning portfolio, including learning goal, course work, reflection and self-assessment record, teacher feedback record, peer feedback record, and personal web page; where only the learning goal is stored in memo form, the course work column gives the total number works, while only respective filenames are stored in the rest of the columns.

? Course work data table: in consideration of the differences of works within the student learning portfolio, the record of the table will be updated dynamically when students upload a new work. Data include work-file path, work outline, date of update, status of completion, and grade of works.

Discussion Database is an independent database specially designated for the portfolio discussion board, including two main data tables:

? topic data table: store information and contents related to the topic of discussion.

? article data table: store information and contents of articles of discussion, associated by the column of Title ID with the topic data table.

Bulletin Database is designated for the portfolio bulletin board containing only one news data table to store system notices, course information and news as a dynamic message announcement and presentation for

teachers and system manager.

Applicability and Effects of WBLP

The WBLP system was implemented on the "Computer and Instruction" course of Teacher Preparation Program for a period of one and a half month. There are 35 pre-service teachers who enrolled the course. Finally, an evaluation was conducted and focused upon system functions, system use, and perceived effects. The evaluation result was has deduced through the statistics analysis of the
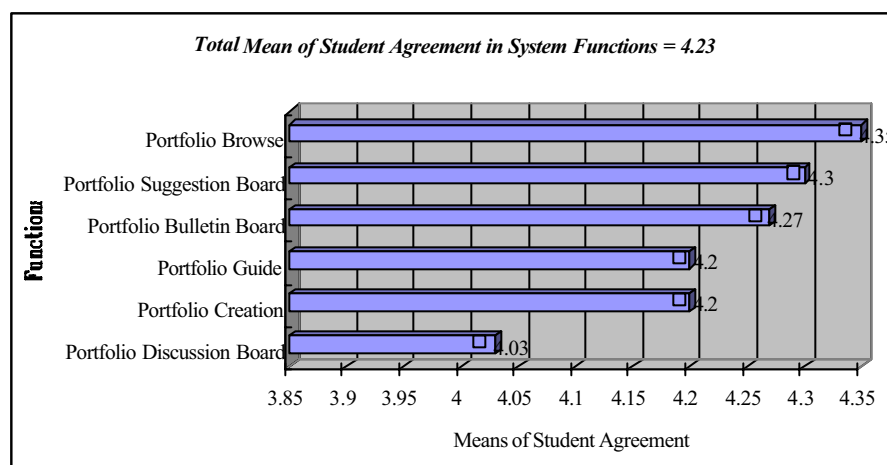
Figure 2 The distribution of means for student agreement percentages in functions of WBLP elements

questionnaire.

Applicability of System Function

In the comparisons among the applicability of functions of WBLP elements (mean = 4.23), users regard that *Portfolio Browse* has the most satisfactory function (mean = 4.35). 90% of the users are satisfied with applicability of function of *Portfolio Browse*. 10% of the users think ordinary. Adversely, *Portfolio Discussion Board* has the least satisfactory function (mean = 4.03). 77% of the users are satisfied with applicability of function of *Portfolio Discussion Board*, nevertheless 23% of the users think ordinary. This result reveals that participations in web discussion and interactive mechanisms of *Portfolio Discussion Board* are needed to improve. Figure 2 shows the distribution of means for student agreement in functions of portfolio elements.

Perceived Effects

Among the ten effects of portfolio in terms of setting up learning goal (mean = 4.07), peers' course works (mean = 4.33), writing self-reflection and assessment records (mean = 4.27), teacher feedback (mean = 4.43), peer feedback, browsing peers' portfolios (mean = 4.3), browsing elements of peers' portfolios (mean = 4.35),

Portfolio Bulletin Board (mean = 4.43), *Portfolio Discussion Board* (mean = 3.83), *Portfolio Suggestion*

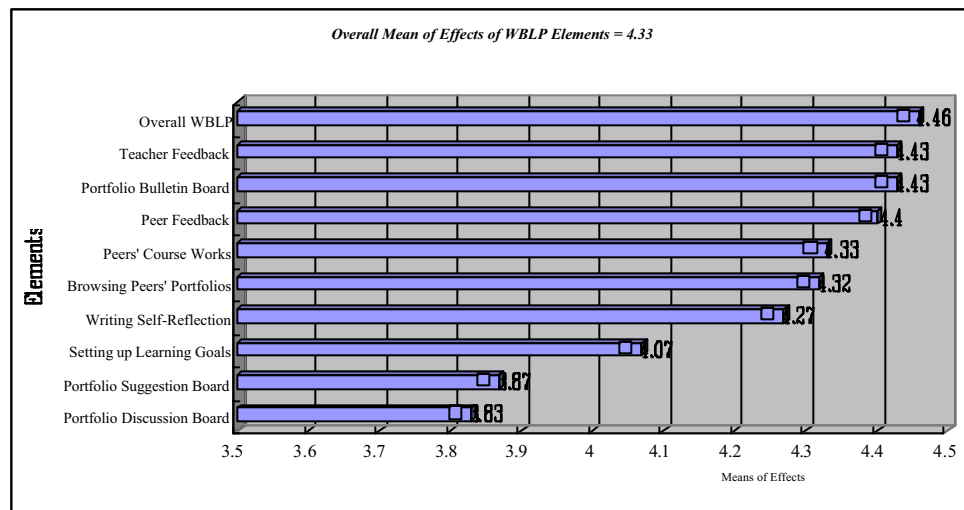
Overall Mean of Effects of WBLP Elements = 4.33

Figure 3 The distribution of means for student agreement in effects of WBLP elements

Board (mean = 3.87), overall WBLP (mean = 4.46), the overall WBLP has the highest effect (mean = 4.46). 92% of the users regard that overall WBLP is beneficial to their learning. Effects of teacher feedback and *Portfolio Bulletin Board* (mean = 4.43) are the second highest. 93% of the users regard that teacher feedback helps them to reflect on their merits and shortcomings in learning. 90% of the users regard that the information in *Portfolio Bulletin Board* helps them to better understand the course.

The lowest ones are the effects of *Portfolio Discussion Board* (mean = 3.83), *Portfolio Suggestion Board* (mean = 3.87). 74% of the users regard that the articles of *Portfolio Discussion Board* may help their academic growth, nevertheless 20% of the users think ordinary. 73% of the users regard that the message feedback in *Portfolio Suggestion Board* helps them to solve the problems in portfolio creation, nevertheless, 17% think otherwise. These results reveal that discussions among students and feedback from teachers in are needed to improve. Figure 3 shows the distribution of means for student agreement in effects of WBLP elements.

Conclusions

The construction of the WBLP system that integrates portfolio rationales and Internet technology, and that is authentic enough to serve the learning needs of college students, is really not a simple task. As an authentic assessment tool, the WBLP system could reflect authentic needs for students' doing projects and learning. Next step we will reinforce the system expansion and maintenance, the system dynamic management and automatic assessment mechanism in particular, such as excellent work automatic marking, teachers' creation of assessment table (e.g. teacher-assessment table, student self-assessment/peer-assessment tables), teacher-assessment and peer-assessment scoring record and statistics, frequency of browsing teacher and peer feedback, frequency and time record of browsing peer works, frequency and time record of peer work being browsed, system uses reward scoring mechanism, cross-course uses (these functions have been included in the WBLP system but operated manually).

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