

# **ELECTRONIC PORTFOLIOS AND LITERACY DEVELOPMENT:**

## **A COURSE DESIGN FOR EFL UNIVERSITY STUDENTS**

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### **Abstract**

This study aimed to investigate whether and how students change in writing and learning by constructing electronic portfolios in an English composition class. The course of English composition was conducted within a web-course system developed by National Chung Cheng University in Taiwan. The study found that significantly students favored the course design of electronic portfolios and considered it conducive to their writing and learning. Such a composition course that infuses the electronic portfolio was regarded as advantageous for being convenient and flexible, promoting autonomous learning, involving frequent writing and reading, enhancing critical reading and writing skills, fostering information literacy, and cultivating ownership and authorship. Not only students' changes in learning attitude as well as concepts of writing were observed, but also their writing was found significantly better in quantity and accuracy. Challenges encountered were mainly related to computer networking, students' preference of classroom interaction and test administration, and assessment of electronic writing. The study suggests that electronic composition classrooms should blend into course design components such as scaffolding information literacy, teacher-fronted instruction and writing conferences, paper testing, and discussions of e-literacy and integration of verbal and visual rhetoric.

### **Introduction**

Literature abounds in discussions of portfolios as a potent device in teaching and learning writing. The use of portfolios especially embraces several benefits. First, portfolios can display students' growth in writing over a period of time (Hamp-Lyons, 1994; Herter, 1991). Second, portfolios which contain several samples written under different conditions provide a more comprehensive picture of students' competence to the teacher (Hamp-Lyons, 1994; Herter, 1991). Third, a portfolio approach to writing shares the values of the process classroom and provides students with opportunities to revise and ask for help (Hamp-Lyons, 1994). Fourth, when managing their portfolios, students become active in and responsible for their learning and develop a sense of ownership (Gottlieb, 1995; Newman & Smolen, 1993; Vacca & Vacca, 1993; Valencia, 1990). Most important of all, by constructing writing portfolios, students are empowered to see themselves learning as writers, not as required for grades (Chen, 2000).

Electronic portfolios, a pedagogical practice allowed by the infusion of technology into the classroom, are like paper portfolios used to profile and document students' learning and growth over time. They also serve as an effective device to interweave assessment with teaching, but they maintain all the benefits of paper portfolios and exceed them in such aspects as display flexibility, minimal storage space, easiness to backup and upgrade, long shelf life, portability, accessibility etc. (Barrett, 2001).

In addition, electronic portfolios can be more meaningful than paper portfolios for students in terms of writing motive and audience. The constructing process creates a supportive writing community beyond classroom, sharpens students' technology skills, and eventually, accentuates their sense of achievement. Wall & Peltier noted that by "going public" with electronic portfolios their students "transformed their school-bound ideas of audience, fostered their own sense of community extending beyond the classroom, and renegotiated the traditional terms of ownership of student writing" (1996: 207). Phinney (1996) found that her students who chose to do electronic papers with hypertexts enjoyed the task immensely and many appeared to be more involved in their work.

The term "electronic portfolio" varies in definitions. It may refer to "digital portfolio," which contains the artifacts transformed into computer-readable form, saved on a disk or a CD-ROM, and is usually confined to a single computer, such as Campbell's CD portfolios (1996). Or, it can be a learning support system like efolios of Pullman (2002), or software tools built into existing campus information systems. Another perception of "electronic portfolio" indicates a set of student-generated hypertexts accessible through the Internet like the one described in Watkins (1996). Varied definitions are like what Yancey (1996) stated, "designed for a specific population...[and] local in their application" (p. 132) and imply distinct uses.

Applications of electronic portfolios in Taiwan have shown great promise. Chang and Tung (2000) and Yue and Wang (2000) developed web-based learning support systems as electronic portfolios. Although the portfolio systems were considered beneficial to learning, students, not authorized to compile and manage their work at their will, did not have the "proprietorship" as Purves (1996) claimed. In addition, the learning subjects are related to web-based learning and in the Chinese context not specific to English learning. Given the scarcity of our knowledge about the use of electronic portfolios in English learning in general and writing instruction in particular, it is worth inquiring how electronic portfolios promote student learning in the composition classroom, especially in the context where English is spoken as a foreign language (EFL).

## **2. Method**

### **2.1. Participants**

Twenty English majors of National Chung Cheng University participated in this study. Some students created paper portfolios before, and their computer literacy and skills varied. Most students were familiar with the webcourse system and equipped with some basic technology skills.

## 2.2. WebCourse System

The English composition course was conducted within a webcourse system developed by National Chung Cheng University in Taiwan. The system encompasses valuable features such as Announcement, Course Information, Courseware, Homework & Quiz, Discussion, and Tools. When students log into the course page, they are first informed of what they need to do for the course. Then they can follow the course schedule, browsing the course materials, posting articles at specified forums, turning in assignments, and/or doing the online tests/exercises. Figure 1 presents the introductory page of the course.

Figure 1. [Introductory page](#) (course announcement)

## 2.3. Design of E-Portfolio Writing Curriculum

This composition course includes several indispensable components:

- (1) four learning dimensions: cognitive, affective, metacognitive, and social;
- (2) three evaluation formats: teacher, self, and peer evaluation to demonstrate power and authority being shared in the classroom;
- (3) electronic learning media: students need to have access to computers, world wide web, and multimedia tools to produce electronic portfolios.

The goals of the curriculum are to help students: develop writing skills necessary for varied language functions, reflect on their writing development, become active in and responsible for their learning, appreciate collaboration with others, think, read, and write critically, write with appropriate English structures and written expressions, and display skills of electronic writing (mastery of the software tools such as Microsoft PowerPoint and FrontPage, or Macromedia DreamWeaver, etc.).

The course itself can be considered transitional from paper-based to electronic-based. During teacher-student conferences, students still turned in drafts in hard copies. Otherwise, they posted journals and responses, shared drafts and review comments, turned in peer and self evaluations, and showcased portfolios electronically. The course design stresses both writing process and product by double assessing portfolio contents. To highlight the importance of revisions, students' composition drafts are read and graded as works in progress with grades provisional and revisable along the processes. Portfolios, though presented as products of students' efforts, are not the only thing graded in the course. The final grade is based on students' performances in web-posting, peer reviewing, revising, timed writing, masterpiece/portfolio sharing as well as on online grammar exercises and writing tests. Table 1 outlines the course design. Figure 2 shows assessment results (percentage, grade, and rank in class) displayed by the webcourse system. Figure 3 presents a student's working portfolio.

Table 1. [Design of E-portfolio Writing Curriculum](#)

Figure 2. [Assessment results](#) (percentage, grade, and rank in class)

Figure 3. [A student's working portfolio](#)

## **2.4. Data Collection and Analysis**

This study aimed at investigating whether and how students had made progress in writing and learning by constructing e-portfolios in a web-based composition course. Data were collected from a questionnaire survey, interviews, classroom observations, students' web posting and portfolios. Multiple sources and methods were employed to ensure methodological triangulation (Denzin, 1978).

A survey on students' perspectives of the e-portfolio curriculum and their learning was administered by the end of the course. Each item was scored on a 5-point scale from 5 "strongly agree" through 3 "not sure" to 1 "strongly disagree." A couple of items were reverse-scored in order to reduce response set bias. Frequencies were grouped into three categories - "agree and strongly agree", "not sure", and "disagree and strongly disagree" due to small sample size. Results of the survey were analyzed by a chi-square "goodness of fit" test to detect differences in students' opinions and perceptions with significance value set at .05.

Interviews and observations were integrated into classroom procedures. During teacher-student conferences, students were interviewed to understand their concerns and difficulties in learning processes and the information used as a reference to improve teaching strategies and course design. The teacher also took observation notes after reading and responding to students' web postings and/or online interaction with students. Both interviews and observations were employed to cross-validate the survey results.

Students' learning progress was investigated based on their portfolio reflections as well as frequency and accuracy of their web postings. Given that students' free writings on the web mirrored their competence authentically, such samples were chosen, scrutinized, and then analyzed by paired t-tests to detect differences in their writing between two semesters. Frequency was recorded by the web-course system. Errors were first detected by Microsoft Word's spellcheck and grammar check tools and then examined by two teachers. Students' journals and reflections were coded by two independent coders with agreement on themes and categories to interpret student's growth and change.

## **3. Results and Discussions**

### **3.1. Students' Perspectives of Learning Achievements and the Curriculum**

The survey results (see Appendix A) showed that by the end of the course, significantly more students stated that they were good learners ( $X^2=7.3$ ,  $df=19$ ,  $p<.05$ ), writers ( $X^2=7.3$ ,  $df=19$ ,  $p<.05$ ), readers ( $X^2=11.5$ ,  $df=19$ ,  $p<.05$ ), and had fulfilled the course requirements ( $X^2=9.7$ ,  $df=19$ ,  $p<.01$ ), and that the course had met their expectations ( $X^2=7.9$ ,  $df=19$ ,  $p<.05$ ). As for computer skills, students seemed to be conservative about their achievements; nevertheless, the mean of 3.1 suggested that students were prone to considering they have gained relevant skills of computer technology.

As regards students' opinions of the e-portfolio curriculum, significantly the students favored the implemented e-curriculum. Ninety percent disagreed that the curriculum is very boring and unreasonable but deemed it as meaningful and rewarding ( $X^2=29.2$ ,  $df=19$ ,  $p<.01$ ). A great majority agreed that they benefited from the curriculum in such aspects as writing and reading ( $X^2=7.6$ ,  $df=19$ ,  $p<.01$ ), collaboration and communication ( $X^2=7.6$ ,  $df=19$ ,  $p<.05$ ), intrapersonal examination ( $X^2=17.5$ ,  $df=19$ ,  $p<.01$ ), computer skills ( $X^2=29.2$ ,  $df=19$ ,  $p<.01$ ), and critical thinking, organizational, analytical skills ( $X^2=29.2$ ,  $df=19$ ,  $p<.01$ ), though half of them were not certain that the curriculum helped them develop closer relationships with classmates (still rated at a mean of 3.13).

### **3.2. Advantages and Challenges**

The content analysis of interview transcripts, observation notes, students' journals and portfolio reflections discovered several emerging themes subsumed under advantages of the e-portfolio writing curriculum and implementation challenges. The perceived advantages are discussed below:

1. It is convenient and flexible. Students felt they were given more freedom in this e-course of writing. At first they came to the assigned computer lab during the class meeting, but gradually some logged into the course page without showing up in the classroom. They became accustomed to the virtual classroom. They were informed of the course requirements and could turn in their assignments anywhere any time as long as they accessed the course page via the Internet. They deemed this e-curriculum as convenient and flexible.

2. It imposes strict deadlines on assignments and promotes autonomous learning. The webcourse system announced deadlines of the assignments and reminded students of what to be done whenever they logged into the course page. Failing to meet the deadlines, students would not be able to turn in assignments (e.g. drafts and reviews) to the course page nor get graded. Students considered the webcourse system a "cold and strict manager" (C03, Journal, 2002/11/05) but helped them avoid procrastination and develop a good habit of time management.

Given that all assignment instructions (including writing models, guidelines, and Internet sources) are available at the course page any time, the teacher lectured only when a new composition task started or a writing test or timed writing was given. All the other time students

were learning by themselves. In fact, they could also choose not to meet the class in person, but virtually instead. They could interact with the teacher or other classmates via the message board whenever help needed. They could log off whenever tasks finished. Enjoying the control of learning at their own paces, students achieved learning autonomy.

Learning on the Internet is so convenient that we can use it any time and everywhere. That's the most different part in learning from our freshman composition. This is also the first course that I spend so much time on the Internet. Setting the deadlines prevents us from handing in papers late. For me, that's really a strong strength to push me to accomplish the assignments on time. (C15, Journal, 2002/10/23)

3. It involves students in frequent writing and reading. Students were required to write and respond to others at least once a week on the forum, with extra credits earned when posting more on the Web. They posted writings because they had to at first, but they became quite fond of doing so later. As time went by, the class was developing into a supportive writing and learning community on the forum. Responses nurtured student writers so much that they changed their view of writing from private to that of communicative and shared. Some had taken to writing and sharing so much that they formed a habit of reading and responding on the forum. The following excerpts describe how one student first presented her perspective of the writing forum; then the other responded with a similar notion that the forum had made writing as sharing thoughts, concerns, and care.

I think this composition site is a wonderful land. In this web site, I can know every classmate; I can know what happened to them and their situations. It is a place of sharing emotions and feelings with each other. Moreover, you can find you have many friends that they know you and show considerations to you. The invisible gap smashed little by little with classmates' reflection and reading your articles. (C02, Journal, 2003/3/25)

I also agree to your view. In the past, I post the article in this composition site because the professor asks us to do it. However, now I've found the composition is really useful for me, especially the discussing area. At first, I did not feel comfortable to write about my feelings. I thought they're personal and private, should not be read by all in the class. But little by little, when others reply to my article, I always felt warm and happy. Sometimes the suggestions which classmates offer are really helpful for me. When I know that certain classmate understand what I really want to express, I am moved....some people are not good at expressing by speaking. Therefore, through this discussing area, we can express what is in our mind by writing. Now, I like this place very much. I can post my feelings or experiences to share with others. (C06, Journal, 2003/4/1)

4. It engages students in critical reading and reflection and enhances their writing knowledge and skills. This e-curriculum demanded students review each other's drafts. Students stated that their writing and reading skills were sharpened by both reviewing peers' writing and gaining feedback from multiple perspectives. They considered the electronic colored notes of peers (pertaining grammar, wording, and mechanics) made adjacent to or in the margin of their text helped them see the differences and observed appropriate ways to express their meanings. Doing peer reviews, students realized they had learned from each other how to read and comment.

I made progress in writing and reviewing. I wrote more and better. Feedback from peers and teacher helped me revise and produce good compositions....I learned to use colors to mark my peers' drafts and provide comments. Reading my peers' feedback, I also learned how to review and give specific and good comments. (C18, Portfolio Reflection)

In addition, reflection, the center of epistemological awareness, was required in portfolio pedagogy. During the semester, students were told to examine their writing with reviewers' feedback in each composition task, and by end of the semester, reflect on their semester-long writing progress. In their portfolios, they needed to present a reflective paper, which contained discussions of their writing processes, strengths and weaknesses, the texts chosen and rhetorical strategies used, readers' feedback and revisions hereto, and relationship among the collected texts. Critical reflections made their writing process and progress visible. For example, one student said,

When I put all my drafts of every composition in order, I read all my drafts again. This kind of feeling is really amazing! I really feel that my writing style has changed little by little. Reviewing and revising are painful but helpful. Because of the help of my peers and professor, I improved my articles a lot. (C05, Portfolio Reflection)

5. It fosters students' information literacy. Learning via network and presenting writing with multi-media is an essential goal set for this curriculum. A couple of students were not sure about their computer skills at first, but by the end of the second semester all of the students presented their e-portfolios and fulfilled the course requirements step by step. With the help of technology, they all felt empowered as writers and designers when witnessing their e-portfolios in shape and winning applause from audience (Observation, 2003/06/12). In fact, regarding the portfolio project, students seemed to place more emphasis on the technology than writing. They were awed by the advanced technological tools such as digital camera and authoring tools for webpage design, and enjoyed so much incorporating text, graphics, music, and pictures into their designs. To them, electronic portfolios provided them a playground for learning where they could explore technological information in a playful way. For example, one student remarked that

It's not the first time for me to do the portfolio, I still feel very nervous....Because I had no idea about how to use FrontPage, I had to figure it out step by step. That increased difficulties of finishing the portfolio. However, I still made it. I really learned a lot through the process....I spent a lot of time making my composition comfortable to read. I searched from the Internet for appropriate pictures and music. I used different fonts and colors to display my writing. I had so much fun in experimenting and designing. It's like playing with those artifacts as blocks and bricks. I was creating a magic kingdom of my own. (C03, Portfolio Reflection)

6. It cultivates ownership and authorship. This curriculum allowed students to generate electronic portfolios of their own by experiencing and demonstrating writing with the power of information technology. While creating their electronic portfolios, they were constructing knowledge as authors and designers, rather than mere consumers of information (Perkins, 1986). This act of creating/constructing meaning cultivates student ownership and authorship immensely.

Addressing to readers of their portfolio reflections, students regarded themselves as writers and designers.

My brain child was finally borne to the world! It is designed as a notebook, just like my diary, recording all my works and wonderful memories in the semester.... I arranged the content in the order of dates so that you readers can see the progress of my writing. (C08, Portfolio Reflection)

From blank to what you are now seeing, the process is full of difficulties. However, I finished it! I found a lot of fun in creating an e-book of my own. It puts topics of writings on the left in the order of my preference. But you may choose to read what interests you by clicking on the links....My portfolio may not be perfect, but it is special and unique. For it represents my creation and records my effort and growth. (C15, Portfolio Reflection)

Challenges encountered during the curriculum implementation are identified as follows:

1. It increases distance among students and the teacher. Some students felt uncomfortable or insecure when not seeing a teacher lecturing in front and classmates around. They felt the teacher and classmates were far away in the networked class and preferred seeing and talking to people in person; however, a virtual classroom was more appealing to others. The following excerpts show how two students posed different perspectives on this issue and indicate students differed in learning and communication styles.

In this semester, we attend the class through the Internet....To tell the truth, I feel strange that the teacher is not in front of the class. I am not used to this kind of class. First, I am a person who doesn't like to talk with others through the Internet. Talking with people through the Internet makes me feel strange. I cannot have the "security." ... we talk to each other through the Internet, we only can see the words ...cannot see the expressions on each other's faces..... Sometimes I will feel disappointed seeing the words of other people through the Internet... maybe they never thought about that what they said would hurt me. Sometimes they even don't want to hurt me, they just talk to me with their ways. However, it is hard for me to recognize what the true meaning in their words. Sometimes, they just have a joke, but I don't know because I cannot see their faces. (C09, Journal, 2002/10/15)

In fact, I feel totally different from you. I feel much safer to be in front of the computer instead of face to face! Sometimes I don't like the traditional way of attending classes, and here are some reasons to explain why. First, sometimes I just can't stop chatting to other people in the class, therefore, sometimes I'll miss out some important information from the teacher. But since almost every single announcement from the teacher is put online now, I don't really have much time to chat with my friends by "typing." This problem no longer exists! Second, I don't like to walk out the classroom to go to the toilet or something when the teacher is on the stage (even if the teacher permits), maybe this

can be regarded as my personal problem, but I personally think it's rude to do so. And now, since the teacher is not here, I can always feel free to take a short rest or go the wash room. Well, I think I'll like the Internet classes more and more! (C19, Journal, 2002/10/16)

In about a month, perceived distance diminished gradually when students were acquainted with the electronic classroom and found they got more freedom in learning. As one student pointed out, "After about one month's learning, I have been used to this way of class and quite enjoy it. We get more freedom." (C04, Journal, 2002/10/20). Another student added, "Although we do not see the teacher and classmates, we increase the interaction through words." (C05, Journal, 2002/10/21).

2. It frustrates students by online tests. The webcourse system allows tests in formats of true-or-false, blank fillings, and multiple choices. Students took the online test every week to exercise their grammatical knowledge. They got scores immediately after submitting their answers online. Some got frustrated for not being able to get satisfactory grades; others were annoyed for not finishing the test due to computer sudden breakdowns or certain unknown technical problems; a handful of students did not like the electronic way ("clicking the mouse only" C11, Journal, 2003/11/11) to answer the test. Mostly students' frustration or confusion resulted from insufficient knowledge of English grammar and computer networking. To drive their learning motive and boost their confidence, online tests were later established as weekly self-tests and test items adapted from exercises of the grammar book used in the class.

3. It irritates students when computers have problems or breakdowns. Fear of computer technology is gender-related (Chen, 2002). At the beginning of the course, the class, mainly composed of females, showed uncertainty about their computer skills. A few, lost in the middle of computer breakdowns, expressed great concerns of this problem. Besides, after students got accustomed to the ease of Internet accessibility, they saved their writings or projects at the server provided for the webcourse. They felt annoyed if the uploaded file was missing without any clue or warning. Below is an example of students' frustration.

After I upload my work, I can't open it directly on the website. When I click on the file, it just opens a blank one. I can't see my article at all. What happened? I tried many times but the results are the same. God! It's so terrible. The other trouble is that if you just hang on the site for a long time, the system will kick you out. Many times when I prepared to type something after Professor Chen turn off the broadcasting system, I found the system had already kicked me out. I needed to type what I had written again. However, for most of time, I just gave up those articles because I was lazy to re-enter the site again. And I don't remember exactly what I just wrote. (C12, Journal, 2003/01/04)

As a student noted, a traditional classroom is more "human and reliable because learning through computers can be so troublesome and annoying sometimes." (C11, Interview, 2002/10/06). This suggests the limitation of computer technology in pedagogical practices and the irreplaceable essence of traditional human communication.

4. It demands intensive use of computers, which causes harm to vision and health. Some students brought up their concerns about declining vision and health after intensive use of computers. The course demanded them to utilize the tool of computers and access the Internet frequently. "Because the entire course is put on the Internet, we have to spend more time to get along with computer. It does damage to our eyes." (C08, Journal, 2002/10/21). The e-portfolio task especially made them "sleep with the computer" for several days (C07, Portfolio Reflection). Of course the teacher also experienced the same problem (blurry vision and pain in back and wrist) while setting up and conducting the class via network. Apparently the e-learning class was realized as a double-edge sword, which facilitates learning and writing but risks health when used inadequately.

5. It involves reading and assessment of visual text, not only verbal text. While the class was shifting from paper-based to electronic-based, assessment became a thorny issue. As most students enjoyed using visual or even audio devices to display their writings, graphic design and visuals were highlighted in student assessment (Observation, 2003/01/12). In the paper-based writing classroom, students' writing performance is mainly assessed by what is written, that is, the verbal text. But in an electronic writing classroom, elements of visual text and hyperlinks are very likely to be integrated into the verbal text in students' presentations. As Williams (2001b) put it, "After all, we see verbal text before we read it" (p. 125). Following the trend in which literacy is "now changing in favor of visual communication" (Kress and van Leeuwen, 1996: 32, cited in Williams, 2001a: 22), students' electronic writing apparently needs a disparate assessment. In a composition classroom transitional from paper-based, such assessment however may be disadvantageous to those who are still confined to the past training of verbal bias, and/or who are skillful in writing but unable to construct and unravel visuals with technology.

### **3.3. Students' Change and Growth**

Both survey results and content analysis of qualitative data suggested students' changes in learning attitude and writing concepts. Along the course, students gradually got accustomed to networked classes; they became autonomous learners, developed a habit of writing, reading, and reflection, changed their view of writing as private to that of communicative, and felt empowered as writers and designers.

A comparison of students' web-based writing frequency and accuracy in two semesters also demonstrated students' growth in writing. Table 2 presents the paired t-test results of students' writing frequency and accuracy.

Table 2. [Paired T-Test results of students web-based writing frequency and accuracy](#)

The paired test-test results showed that significantly students posted more by topics and words ( $t = -5.209$ ,  $p < .01$ ) and wrote more accurately ( $t = -2.12111$ ,  $p < .05$ ) in the second semester. Close readings of students' journals and responses on the Web in the second semester found that most mistakes are typing or spelling flaws, suggesting that students focused more on meaning and communication in web postings. Interviews with students confirmed that they wrote more freely and frequently online in the second semester (Group Interview, 6/4/2003). Such results indicate that writing frequency improves writing fluency and accuracy.

#### **4. Implications**

Although the effect of e-portfolio curriculum on students' learning and writing was quite encouraging, the following issues need to be addressed and reflected upon in pedagogical practices:

1. Employing models and collaborative groups to support the development of information literacy. To scaffold information literacy, teachers should demonstrate basic skills in hypertext writings in the classroom. Models or sample procedures can be provided at the course page. In addition, novice users of the needed software may be paired up with more experienced ones when the class meets at the computer classroom. Female or less experienced students may be in need of help more at the beginning. Like the scaffolds provided within the zone of proximal development (ZPD), assistance and guidance can gradually remove or fade away as students' mastery of the skills increase.
2. Scheduling conferences and teacher-fronted instruction at the traditional classroom to accommodate different students' preference of classroom interaction. Although e-learning is a trend in this era of technology and information, those who are strangers to the virtual world may easily get lost in a web-based class. A transitional period from paper-based to electronic based should be lengthened when a class is not familiar with virtual communication. Classroom lectures and face-to-face conferences can be scheduled regularly at the beginning and gradually made optional when students feel more comfortable with learning via computer networking.
3. Administering key examinations in paper mode to ensure administration reliability, online grammar exercises as self-tests. Before logistical and technical difficulties of computer networking are under control, high-ratio assessment such as writing tests or timed writing is better administered in paper mode while weekly exercises of linguistic knowledge can be practiced as online self-tests. After all, grades always matter much to students.
4. Discussing the effective use of hypertext and visual rhetoric and modeling as e-literacy learners. Computer technology has revolutionized the writing instruction and reshaped our views of reading and writing. Traditionally, composition pedagogy focuses mainly on verbal rhetoric through a single mode of representation. Seldom are page design and visual rhetoric stressed in teaching and learning. Along with technology advances, visual rhetoric and hypertext writing have entered writing classrooms. Not only computers allow students take control of the page, but also the shape and feature of electronic writing suggest new forms of writing assessment

(Takayoshi, 1996). While "e-literacy" (Hwaisher & Selfe, 1997) challenges traditional literacy and threatens to undermine writing (Pullman, 2002), composition teachers might as well take Takayoshi's (1996) advice—"engaging students in critical assessments of the differences between hard copy and online copy or between reading a printed text and a hypertext" (p. 256). Discussions of effective use of hypertext and visual rhetoric can develop students' awareness of the important features of electronic texts and understanding of how to achieve, not risk rhetorical goals by electronic page design. In addition, we should adopt Williams' (2001b) suggestion that we must model for our students how we integrate visual rhetoric into composition and expand our literacy before demanding the skills to compose and critique new media compositions.

## **5. Conclusion**

This study examined students' perceptions and learning of constructing their electronic portfolios in a networked composition classroom. By the end of the course, it was found that not only did students enjoy the process and product, but also significant growth and change in their writing and learning were observed. The portfolio process demanded them to manage their learning schedule, engaged them in frequent reading and writing, fostered their critical reading and reflection, sharpened their writing knowledge and skills, and promoted their information literacy. Moreover, the portfolio product demonstrated their achievement of ownership and authorship. Results indicated that students achieved autonomy in learning, wrote more frequently and accurately, and most importantly, felt empowered as writers and designers. Challenges encountered were mainly related to computer networking, students' preference of classroom interaction and test administration, and assessment of electronic writing.

The e-portfolio writing curriculum of this study infused technology into the writing classroom. Though labor- and resource-intensive, the study demonstrated that such a curriculum is a worthwhile endeavor to undertake. The forum created by students' weekly writing and responding nurtured student writers and provoked their love for writing. E-feedback color-marked on the draft displayed differences in written expressions and helped students analyze rhetorical strategies and improve writing ability. As to applications of technology and computer software, students eventually were able to bring order to chaos by creating their e-portfolios through purposeful exploration and sustained investigation. The process of problem-solving and writing with visual rhetoric, challenging but rewarding, indeed had their curiosity and motivation piqued. Such finding echoes the claim by Phinney (1996) that students were more engaged in hypertext writing than paper texts. Further, the study suggests that e-portfolio writing pedagogy, when practiced appropriately, has the potential to empower EFL university students as writers and designers. It is by constructing e-portfolios that students perceived their writing process and progress, exercised webpage designing, realized their love for writing and talent in arts, and achieved ownership and authorship.

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## Appendix A

### Results of students' perspectives of learning achievements and the curriculum

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