Designing an Interactive Online Portal for Chinese Essay Writing: An Action Research Study

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Background: Singapore launched the first Masterplan in 1997 to guide the integration of ICT (information and communication technology) in education. Since then many schools have started to explore using ICT in their curricula. The school reported in this paper developed a web-based learning environment to assist students in the use of ICT. However, a number of problems were identified with the English version learning environment. The Mother Tongue Department in this school decided to develop a Chinese version web-based learning environment to help students in essay writing.

Aims: The aim of this study was to develop an interactive online portal that is more practical for students to write essays in Chinese. Specifically, the Chinese version learning environment aimed to: i) encourage the use of Chinese language; ii) promote student's interaction with peers and with the teacher; iii) allow the teacher to control the quality of students' posts; and iv) provide a more user-friendly environment for both students and teachers.

Sample: In the third round of prototyping, 110 students were surveyed. They were all girls of 14 years old. Majority of them (74%) used English as the first language at home. The others spoke Mandarin or dialects at home. Five of them were selected for an interview based on the survey results.

Method: A survey and a face-to-face interview were conducted. The data collected from the survey questionnaire were tabulated, and the interview results were described.

Results: The results found that students posted longer essays with fewer spelling mistakes. The students were satisfied with the content, tools and interface of the environment. However, not all students enjoyed online learning and their Hanyu Pinyin (漢語拼音) skills needed to be further improved.

Conclusion: The action research approach is useful for school teachers to design a complicated system that has not been fully articulated. The design processes of the CL Portal reveals that the action research approach allows a research team to gradually revise a system based on the comments collected and eventually produce an optimal product.

Keywords: Action research; Chinese language learning; Online learning environment

設計互動網絡學習環境，促進華語短文寫作：一個行動研究案例

背景：從 1997 年開始，新加坡教育部就開始逐步推行教育技術在學校的應用。各級中小學校也嘗試將教育技術應用到學科教學中。文中介紹的學校開發了一個英語版的網絡學習環境，但發現對華語教學不是太適用。于是學校華文部就自行開發了一個華文版的互動網絡學習環境。

目的：本研究的目的是設計一個對華語學習更加實用的互動性網絡學習環境，便于學生的華語短文寫作。該學習環境希望能夠激励學生更多地使用華語，促進學生之間以及學生與教師之間的互動，允許教師對學生的短文進行質量控制，以及爲教師和學生提供一個更加友好的用戶界面。

調查對象：在第三輪的原型開發過程中，共有 110 名中二學生參加了調查。她們中 74%的學生平時在家中使用英語進行交流，其他人使用華語或方言。另外，根據調查結果，五人被選中進行面談以便獲取更進一步的信息。

調查方法：主要采用教師平時觀察，問卷調查以及面談的方式進行。

調查結果：調查發現大部分大部分學生更夠寫出更長，更符合語法的短文。學生也對這個網絡學習環境的內容，工具以及界面設計比較滿意。但是，結果也表明，並不是所有的學生都喜歡通過網絡進行學習，學生的漢語拼音技能還需要進一步提升。

總結：本研究表明行動研究方法適合學校老師自行開發比較複雜的學習系統。在行動研究的開發過程中，學校老師可以根據接收到的反饋不斷改進系統功能，逐步設計出符合學習需求的性能比較完善和實用的學習系統。

關鍵詞：行動研究，華語教學，網絡學習環境

Introduction

Singapore launched a Masterplan in 1997 as a five-year blueprint for the integration of information and communication technology (ICT) in education to meet the challenges of the new century (MOE, 1997). Since 2002, Masterplan II has consolidated and built on the achievements of the first Masterplan, and continued to provide an overall direction on how schools can harness the possibilities offered by ICT for teaching and learning (MOE, 2002).

In line with the initiatives of the Masterplans, Singapore schools have started to explore ICT integration into the curriculum. The school reported in this paper created an English version web-based learning environment (Learning Portal) to assist students in the use of ICT. However, a few problems were identified after the Learning Portal was used in an online week. First, the students tended to communicate and write in English in the learning environment for its interface was in English. Therefore, the Learning Portal did not promote the use of Chinese language. Second, the Learning Portal was not very user-friendly to the Chinese Language teachers who came from non-native English speaking countries like China. They were not feeling comfortable with the English interface.

In addition, little interaction was involved in the Learning Portal. Students could not comment on other students' posts. Also, teachers lacked a mechanism to control the quality of students' postings. As a result, the quality of students' posts was unsatisfactory as many students' Chinese Language competency levels were low.

The aim of this study was to develop an interactive learning environment that is more practical for students to learn Chinese language. Specifically, the Chinese version learning environment (CL Portal) aims to: i) encourage the use of Chinese language; ii) promote student's interaction with peers and with the teacher; iii) allow the teacher to control the quality of students' posts; and iv) provide a more user-friendly environment for both students and teachers.

Conceptual Framework

Interactivity

Interactivity is a major construct and striking characteristic of web-based learning environments (Chou, 2003; Mollam, 2003). It is often defined as sustained, two-way communication between students and students, or students and the instructor, with the purpose of learning task completion or social relationship building (Gilbert &

Moore, 1998; Liaw & Huang, 2000). Increased levels of interactivity may result in higher motivation, more positive attitudes toward learning, and increased satisfaction with instruction (Chou, 2003)

Four types of interaction are commonly reported in literature: learner-content, learner-instructor, learner-learner, and learner-interface (Moore, 1989; Hillman, Willis, & Gunawardena, 1994). Learner-content interaction is the process in which learners make sense of the learning materials. It is often considered as a basic type of interaction as content is a primary element in all forms (web-based or face-to-face) of education (Kanuka, 2000). Learner-content interaction is often promoted through individual reflections.

Learner-instructor or learner-learner interaction is the communication between learners and peers, the instructor, or other people to share information, negotiate, and construct knowledge. Learning is a process that not only takes place inside our minds, but also occurs when individuals are engaged in social activities (McMahon, 1997). Social constructivists argue that knowledge is collaboratively constructed in a social context mediated by discourse; learning is fostered through interactive and social activities (cf. Hirumi, 2002; Liaw, 2004). Currently many ICT tools like online discussion forums, chat rooms, or weblogs can be used to facilitate learner-learner interaction or learner-instructor interaction.

Learner-interface interaction refers to how learners use the computer program to communicate with the course content or other people (Lohr, 2000). The learner-interface interaction is essential in an online learning environment since all online communicative and interactive activities are implemented through interaction with the interface.

Based on these types of interaction, the design of a web-based learning environment must focus on content, tools, and interface. To ensure an in-depth learner-content interaction, the content should be relevant, challenging, and flexible enough to meet various students' need (Kanuka, 2000). The tools must enable students to interact with the content, peers and the teacher. The interface needs to be error free, easy to learn, easy to use and attractive. The design processes of the CL Portal in this study focused on the components of content, tools, and interface.

Action Research Approach

Action research is a systematic inquiry method conducted by practitioners to gather information about how their particular schools operate, how they teach and how well their students learn (Lee-Hsieh, Kuo, & Tsai, 2004). This information is gathered with the goals of gaining insight, developing reflective practice, effecting positive changes in the educational practices and improving students learning outcomes and the lives of those involved (Mills, 2003). Unlike other traditional approaches to research which usually conduct a feedback at the end of a project, action research attempts to provide feedback throughout the entire research process and make changes as soon as possible.

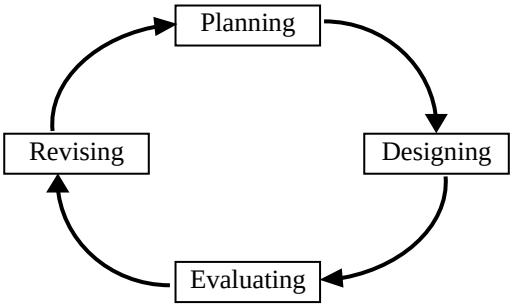

Figure 1: The action research process

Many guidelines and models can guide educators in action research. For example, Kemmis and McTaggart (1998) created a spiral representation of action research. The model includes reconnaissance, planning, first action step, monitoring, reflecting, rethinking and evaluation. Sagor (2000) presented a seven-step process: select a focus, clarify theories, identify research questions, collect data, analyze data, report results, and take action. Mills (2003) described a dialectic action research sequence, which involved identifying an area of focus, collecting data, analyzing and interpreting data, and developing an action plan. All these research action models share common stages of planning, designing, evaluating, and revising as shown in Figure 1. These stages were involved in each round of prototyping in this study.

Design Processes

Three prototypes (Pilot Study, Creative Net I and Creative Net II) were successively developed in this study. Each prototype went through four stages: planning, designing, evaluating, and revising. Each stage focused on the components of content, tools, and interface. The entire prototyping processes took approximately one year. In the following sessions, the design processes of the three prototypes are to be described.

Pilot Study

Planning

In the planning stage, the Chinese Language teachers decided to create a Chinese version learning environment after realizing the problems of the existing English version Learning Portal. A design team consisting of ten Chinese Language teachers was formed, led by the head of the Department of Mother Tongue. As a starting point, the design team firstly explored three educational websites: Free2xpress (http://peach.acs.sch.edu.sg/Free2xpress), Happy Town (http://www1.moe.edu.sg/happytown), and World of Literature (http://www.white-collar.net/).

Free2xpress and Happy Town were chosen because they were locally produced websites supported by the MOE of Singapore. The audience of Free2xpress website is secondary students while Happy Town website is targeted at primary and lower secondary students. World of Literature is a reputable website developed by Chinese educators. It has a wide collection of Chinese literature, stories and commentaries.

The design team gained experience from exploring these web sites. They found that the content of the websites was comprehensive and informative. Also, the content was supported with clear learning objectives and engaging activities (cf. Sim, 2003). The tools involved in these educational websites allowed students to type in information and submit assignments online. The interface of the websites was in Chinese and easy to use. Also, these web sites were updated regularly and supported fast Internet access. However, these web sites lacked a mechanism that students could make comments on others' writing or the teacher could screen student's wring before it was posted.

Designing

After analyzing the above web sites, the design team decided that the content of the new CL Portal must be relevant, challenging and up-to-date, preferably from newspaper articles. The following tools were added to support interactivity:

- A discussion forum: providing a space where students could exchange ideas with peers or the teacher;
- Uploading essays: showing their work to others and obtaining a sense of success when their works were appreciated by others;
- Getting feedback from others: improving the quality of students' essays and motivating students to participate more actively;
- Quality control: allowing the teacher to filter posts before they were submitted.

To make the interface simple and easy to use, two different login web pages were designed for teachers and students respectively. In addition, the CL Portal had clear symbols to indicate the total number of essays submitted and the recent essays uploaded.

Evaluating and revising

After the first prototype had been designed, an evaluation activity was conducted with a group of thirty Secondary-two higher ability students. They were tasked to read a newspaper report and write a short reflection within an hour in a computer lab. The students were observed that they actively explored the system, read the content, and shared their opinions online. However, most of them could not manage to complete the assignment within the time frame. They had some difficulties in using the system for this was a completely new environment for them and no substantial training was conducted before the lesson. Also, discussing in Chinese on the newspaper report seemed to be a challenge to them because most reports they read or heard were in English or they might have not heard about the story in the report at all. They hence needed time to search for additional materials so as to complete the assignment.

After the tentative evaluation, the design team decided to develop a web-based lesson with simpler leaning activities rather than discussing current affairs reported on newspapers. In addition, the interface would be easier to learn and to use, and more instructions would be added to the system

Creative Net I

Planning

The above revision decisions were implemented in this round of prototyping. In addition, a training session was conducted to help the students to: i) get familiar with the learning environment; and ii) practice how to type in Chinese characters by using Hanyu Pinyin. To make the learning activity easier, this prototype would focus on one lesson from the textbook rather than a newspaper report.

Designing

The web-based lesson was simple. The students were shown with some pictures and supposed to write a short description about one of the pictures. This was homework to be completed within two days.

All navigational buttons were supplemented with graphical icons and textual hints to enhance the meaning of the buttons. Also, the colors used in the CL Portal were adjusted to make the interface more attractive.

The newly added tools to Creative Net I were a voting feature and a class web space. This voting tool was to encourage students to read one another's work and think critically. The class web space was added because more classes were involved in this round of prototyping. Each class might have a different topic or time schedule. The students from a class would use this class web space to share information, exchange ideas, or give meaningful comments on their writing.

Evaluating and Revising

Four Secondary-two classes (110 students in total) participated in this round of evaluation. As the system was quite new to them, they spent much time getting familiar with it. Also, they had some difficulties in using Hanyu Pinyin although they attended the training session. In addition, almost half of the students indicated that they could not do the assignment at home because their home computers could not support Chinese input. The students also commented that the lesson content was not attractive and interesting. They did not like uploading their essays online as it would be viewed by their peers.

Feedback was collected from the Chinese language teachers as well. They were satisfied with the features of this prototype and were encouraged by the students' responses. The teachers had made other comments as follows: a) the fonts in the portal were too small and it made marking online tedious and tiring; b) The students might not know where their mistakes were as there were no indications of corrections; and c) the content should be catered to different ability students.

Based on the feedback from the students and the teachers, the design team decided to:

i) provide further instructions on Chinese input;
ii) create a more interesting and attractive web-based lesson covering a learning topic from the textbook;
iii) change font sizes bigger so that teachers could conveniently read and mark the online work; and
iv) indicate clearly the corrections the teacher had made.

Creative Net II

Planning

In this round of prototyping, the same students who experienced Creative Net I participated in the evaluation. They would use Creative Net II and the English version Learning Portal at home for three days, during which they did not come to school and all learning activities were conducted online through the portals.

Creative Net II focused on the design of one lesson. The learning activities in this lesson were expected to cater to different ability students and promote more interaction with peers and the teacher.

Designing

A web-based lesson was created. Different learning activities were provided to meet various ability students' needs. The activity for the higher ability students in the Express and Normal Academic streams was to view a series of animal cartoon pictures and write a story. The lower ability students in the Normal Technical stream viewed the same pictures. But they completed a simpler worksheet rather than wrote a story. In addition, most pictures were presented in flash animations to make the content more enjoyable.

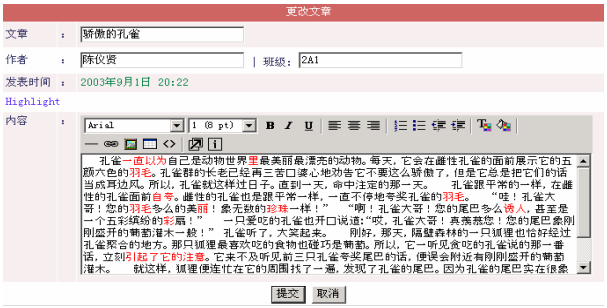

Figure 2: A screen capture of a student's assignment marked by the teacher

As shown in Figure 2, teachers were provided with a tool bar so that they could revise students' essays more clearly. They could directly modify students' essays by using different colors or fonts. This would help students identify where their mistakes were and how the teacher had improved it. Furthermore, compared to the traditional marking on paper, the online marked essays had the potential to be viewed by other students as well.

The date and time of the teacher viewing the piece of work were recorded and shown automatically. Students might not make any mistake, the time stamp attached would help the students know whether and when the teacher viewed it. In addition, a FAQ was prepared to answer students' questions like how to install necessary files for Chinese display or input.

Evaluation of Creative Net II

Participants and Instruments

In this round, all of the 110 students were surveyed. They were all girls of 14 years old as this study was conducted in a girl school. Majority of them (74%) used English as their first language at home. The others spoke Mandarin or dialects at home. In addition, five of them were interviewed. They were selected based on their survey results on the CL Portal: two liked online learning, two did not like and one was neutral.

The main instruments used for data collection were observations on students' assignments, a survey and an interview. The observations on students' online assignments were to find out the effectiveness of the online lesson. A 14-item survey was administered to the participants in classrooms using paper-and-pen. The students were given twenty minutes to complete this survey. A teacher was present to answer students' questions. In addition, a face-to-face group interview was conducted. This interview lasted about one and a half hours.

Observational and Survey Results

The design team would like to investigate whether the CL Portal had helped to cater to different ability students. The teachers observed that the postings in Creative Net II were of higher standard compared to those in Creative Net I. On the average, students posted longer essays with fewer spelling mistakes. The students in the Express and Normal Academic streams were able to write more creative stories. The students in the Normal Technical stream also could complete their worksheets on time. In addition, no students were late in submission of their assignments.

Table 1 shows the students' perceptions on the content, tools and interface of the CL Portal. Basically the students' opinions on these three components were between Neutral and Agree. They agreed that the content was interesting, easy to understand and able to arouse their creative thinking.

Table 1: Students' perceptions on the CL Portal (N=110)

Creative Net II	SD* (%)	D (%)	N (%)	A (%)	SA (%)	Mean# (1..5)
Content						
1. The lesson was attractive, motivating and interesting	1	9	35	48	7	3.5
2. The language was easy to understand	1	19	29	45	6	3.4
3. The content was accurate and informative	1	8	39	48	4	3.5
4. The content was creative and aroused higher order thinking	1	7	38	48	6	3.5
5. I understood the tasks assigned to me	1	10	12	55	22	3.9
Tools						
6. I was able to upload my assignment	4	10	12	58	16	3.7
7. I felt proud to see my work online	3	6	50	32	9	3.4
8. I could easily read my friends' work online	2	12	39	43	4	3.4
9. I could vote the essays I liked	1	5	33	55	6	3.6
Interface & Others						
10. The navigation buttons and links were easy to use	1	14	26	49	10	3.5
11. I could easily identify mistakes if they were marked in another colour	1	4	25	52	18	3.8
12. I could compose an essay individually	2	7	19	63	9	3.7
13. I enjoyed online writing	1	19	29	45	6	3.4
14. I improved my Hanyu Pinyin skills by using the CL Portal	1	5	20	57	17	3.8

Notes: * SD: Strongly Disagree; D: Disagree; N: Neutral; A: Agree; SA: Strongly Agree

1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree

In terms of tools, the students agreed that the tools provided were useful and they could easily use the tools to complete their tasks. The CL Portal was able to support interactive learning. However, many students were not willing to publish their essays online for others to read.

With regard to the interface, the students believed that the navigational buttons and links were easy to use. Also, they liked to see their assignments revised in different colors. The majority of the students felt that the CL Portal was usable.

Most students thought they became more independent and the online essay writing improved their Hanyu Pinyin skills. However, the results also indicated that the students did not fully enjoy online learning yet.

Interview Results

Five students were interviewed. Student A said that it would be better if the teacher could enter the discussion forum more frequently. Student B enjoyed the web-based lesson. However, she hoped fewer words on the website. Student C felt very tedious to work online. She commented that the radiation was bad for eyes and she needed to strain her eyes. Student D admitted that she was very weak in Hanyu Pinyin and thus took a long time to type in Chinese words. She also felt that it was very difficult for her to think of the content and type in Chinese at the same time. Student E thought that she did not have any problem in doing her assignment, as her assignment did not require any input online.

The students were then asked about how they overcame difficulties. Student A replied that she waited for others to submit their assignments first. She could understand better from the submitted assignments. Student B asked her tuition teacher for assistance. Student C went to school to complete her assignment together with her friends. Student D expressed that if she could do the assignment again, she would print out the materials to read, and then write the assignment on a piece of paper before typing. Student E was glad that she did not need to hand in the assignment online as she was very weak in Hanyu Pinyin.

The students were asked for suggestions on improving this Portal. Student A wanted more interesting flash animations. Student B felt that Hanyu Pinyin should be added to all Chinese words on the web site to help her improve Hanyu Pinyin further. Student C expected more educational games, pictures or flash movies. Student D thought online learning was boring. The

CL Portal should be more colorful, with better fonts and bigger sizes. Student E enjoyed online learning. She expressed that this form of leaning was interesting and interactive.

Discussion

Content, Tools, and Interface

This study confirms that content is an important component of an online learning environment. The content must be informative and well presented, preferably in multimedia. Some learning materials in Creative Net II were presented in Flash animations. The students felt that these learning materials were more attractive and motivating. However, results showed that only half of the participants enjoyed the web-based lesson. The main reason was that the students were weak in the Chinese language and Hanyu Pinyin. They had difficulties in typing in Chinese characters. This result reveals that Hanyu Pinyin has been a fundamental hindrance to the effective use of ICT in Chinese language learning and it needs to be further enhanced in Singapore schools.

The CL Portal supported interactivity. The students could upload their assignments online. Also, they could view, comment on other essays. In addition, the teacher could comment and revise students' assignments visually. The students could view others' marked essays and voted for better ones. All these tools encouraged interaction among students, peers, and the teacher. However, a number of participants did not feel comfortable to publish their work online. They lacked the confidence to post their own work online for others to read, for they thought their Chinese language was weak and their essays were not good enough. How to increase students' confidence and improve their Chinese language levels seems to be a chicken-egg problem.

The interface of the CL Portal was simple and easy to use. However, because the interface was in Chinese, the use of the CL Portal became a challenge. Many students had difficulties in reading and understanding Chinese and hence spent much time on the Chinese instructions. They felt tired of reading online for a long period of time.

Additionally, this study also confirms that pedagogical design on content and tools is critical for an effective learning environment. A simple placement of hardware and software will not make ICT integration and effective learning naturally follow (Earle, 2002; Wang & Woo, 2007). The primary factor that influences effectiveness of learning is pedagogical design (cf. Mandell, Sorge & Russell, 2002). Nevertheless, human-

computer interface is an initial requirement for the construction of an effective online learning environment as most learning activities are conducted through the support of computer. Content, tools, and interface are confirmed to be three critical components of an effective learning environment.

Limitations and Future Improvement

This study faced some limitations. First, the literature on the Chinese essay writing was scarce. The designers of the CL Portal were Chinese Language teachers in the school. The pedagogical design of this system was mainly based on their teaching experience rather than existing theoretical models or literature. Second, to what extent the interactive process of writing essays in the CL Portal could improve students' performance was unclear. In this study, the results of students using the Creative Net II were not compared to that of other students who followed the traditional classroom approach. Future study could further investigate the effectiveness of Creative Net II.

More tools will be added into the CL Portal. For instance, a repository database would help teachers and students share their resources online; an online dictionary tool will be useful for students to check for any word immediately; and a chat room may enable students to get immediate responses from others. Moreover, a training tool for improving students' Hanyu Pinyin skills would be useful as well.

Conclusions

The CL Portal was created by following the action research approach. It progressed through three rounds of prototyping, and each prototype focused on three elements of content, tools and interface.

The final results indicated that the content met the needs of students with different learning abilities. Majority of the students could learn online and complete their learning tasks on time. The tools helped students to upload their essays, vote for better essays. Also, the tools allowed teachers to comment and revise
the students' essays directly. The interface of the CL Portal was easy to use. The students met fewer technical problems when they were using Creative Net II.

However, the results also revealed that not all students liked using the Portal to learn online. Some students could not manage to complete their assignments on time. The Students' Hanyu Pinyin skills need to be further improved. Also,

the students' Chinese language competency level affects their attitudes towards the use of the learning environment.

This study confirms that the action research approach is useful for school teachers to design a complicated system that has not been fully articulated. Although Creative Net II still has many aspects to improve further, it is better than the first two prototypes. The design processes of the CL Portal reveals that the action research approach allows school teachers to gradually revise a system based on the comments collected and eventually produce an optimal product (Nieveen & van den Akker, 1999).

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