

# The explore of the Case Study activities with a Web-based Environment

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**Abstract:** This article is to introduce the explore method of case study activities with a web-based environment (WebCASE), including the learning object, the study proposal and the conclusion's discussion. In this paper the research mainly concerns problems from two levels: one is how to organize case study activities and the other is how to use effective web-based study environment to support case study activities. We develop two sections of research work: prototype implementing section and practice research section. In prototype implementing section, we study the current popular case databases all over the world and the requirement for web-based case study environment of users by literature review, questionnaire statistics, and personal interviews. Based on the initial requirement, we design and implement a prototype system of Web-based Case Assisted Study Environment, WebCASE. Research work and results of prototype system implementation can be found in. In practice research section, we study the case study activities supported by WebCASE prototype system, with the course "Industry System Introduction" as our reference.

**Keywords:** Learning object, learning evaluation, web-base case assisted study environment, case-based learning activity

## Introduction

From 2003 to 2006<sup>[1]</sup>, the Web-based Case Assisted Study Environment (WebCASE) had supported the case study activities for a period and our research mainly concerns problems from two levels: One is how to organize case study activities; the other is how to design effective on-line study environment to support case study activities.

In the purpose of continuously improving our research result and conclusion, we exactly follow the design-based research pattern which is an emerging technique all over the world. Quantitative research and Qualitative research are two basic types which social science researchers often use, and both of them have been used widely in educational science researches. Although these two research patterns differ in philosophy basis, applicable conditions, and operating methods, both of them aim at describing and illustrating learning and objective phenomena, basic relationship or rules in education area, not directly focus on how to improve human's study and education<sup>[2]</sup>. In 1990th, some researchers (Brown, 1992; Collins, 1992) reconsidered the problems of orientation, thinking and methods, and then put forward the concept of "design-based research"<sup>[3]</sup>. Design-based research aims at verifying and improving principle-and -pre-study-based education design through forming study process<sup>[4]</sup>. Design-based research use "improve by steps" to put initial design into reality to see its effectiveness, then improve application basing on the feedback of practice, till all the biases are fixed. Hence, a more reliable and effective design

is formed <sup>[5]</sup>. Following this pattern of design-based research, we develop two sections of research work, as follows:

In prototype implementing section, we study requirement for online case study environment of users by literature review, questionnaire statistics, and personal interviews. Based on the initial requirement, we design and implement a prototype system of Web-based Case Assisted Study Environment, WebCASE. Research work and results of prototype system implementation can be found in.

In practice research section, we study the case study activities supported by WebCASE prototype system, with the course “Industry System Introduction” provided by Professor Darong Lu as our reference. In this paper, we mainly concern problems in four levels: first is the study environment, studying overall teaching effectiveness and main functions of WebCASE; second is learning object, studying how original cases developing in WebCASE systems; third is study process, how to organize case studies under the support by WebCASE; finally is study evaluation, how to generally and effectively evaluate students’ performance in case study activities.

Research on WebCASE prototype system based case study activities in system applying section is the emphasis of this paper, and we will introduce research and results of system improvement section in another paper later.

## 1. Learning Object Selection

“Industry System Introduction” is started as a basic course for the requirement of integration of High Education Courses, as a compulsory undergraduate course of College of Economy Management, and also an elective course for all engineering majors, this course aims at developing engineering diathesis and economy concept. Teaching should be open, innovative, and encouraging students to study by themselves and collaborate. In 2005 summer, 2005 autumn, 2006 spring, 2006 summer and 2007 spring, teachers organize students with case study activities based on WebCASE and student-summer social practice activities in collaborate study mode. Basic practice mode is Web-Enhanced Instruction, i.e., teachers are still organizing normal classes, and case resources and online study environment are used to help students finish study load to enhance the study effectiveness of this course.

In order to be in line with research progress, we select “Industry System Introduction” in 2007 Spring Semester as research area, and take case study activities supported by WebCASE as learning Objects. 22 undergraduates from different departments and grades are enrolled in this course, and 10 cases are given to students at the beginning of the semester, as shown in Table 1.

Table 1 Case List of “Industry System Introduction” in 2007 Spring Semester

Case Index	Case Title	Corresponding Section
C1	2002-2004 Lack of Electricity all over China	S1 Energy Sources Industry
C2	Switchback of Steel Price in 2004 Jan-Jun	S2 Metallurgy Industry
C3	Troubles in GMP Identification of Pharmacy	S3 Chemistry Industry
C4	Tsinghua Mechanism Factory ERP Applicability Analysis	S4 Mechanism Industry
C5	DaQing Railway Heavy-load transportation	S5 Car Industry
C6	Natianal CPU “LongXing” development and future	S6 Information Industry
C7	China Milk Product Indutry Report	S7 Light Industry

C8	Beijing CBD now and tomorrow	S8 Construction Industry
C9	China Agriculture and Solutions	S9 Agriculture
C10	Comparison and Analysis of Beijing 3-biggest Newspaper Group	S10 Third Industry

Above ten cases are related with ten major industries in Civil Economy, students are required to select cases and group according to their interests, and they need to submit a case analysis report at the end of semester, one report each group. At last, C1, C2, C3, C5 and C8 are chosen by students, 10 of them select C1, 3 of them select C2, 4 of them select C3, 3 of them select C5, and 2 of them select C8. Considering the capacity of each group, students who select C1 are divided into two sub groups, five students each group. So finally, 6 groups (G1-G6) are formed up. This paper takes the case study activities of these 6 groups as learning Objects. Their Group IDs, numbers of students, selected cases, and case analysis reports are listed in Table 2.

Table 2 Group List of course “Industry System Introduction” in 2007 Spring Semester

Group ID	Case ID	Case Title	Index	Case Analysis Report
G1	C1	2002-2004 Lack of Electricity all over China	R1	Lack of Electricity all over China-Reason, Effect, and Solutions
G2	C1	2002-2004 Lack of Electricity all over China	R2	East China Electricity Supply Analysis in 2003-2004
G3	C2	Switchback of Steel Price in 2004 Jan-Jun	R3	China Steel Problem - From view of Steel Price
G4	C3	Troubles in GMP Identification of Pharmacy	R4	GMP Identification and the future of China Pharmacy
G5	C5	DaQing Railway Heavy-load transportation	R5	Case Study: DaQing Railway Heavy-load transportation
G6	C8	Beijing CBD now and tomorrow	R6	Beijing CBD Development Plan and current status

## 2. Research Plan and Implementation

To solve the problems of study environment, learning Object, study activity and study evaluation in case study activities, we have done researches in 4 following sections.

**Scene Observing Section** During the semester of 2007 Spring, we have been participated the course as teaching assistant of “Industry System Introduction”, and we also maintain the WebCASE system as a system administrator. We can observe progress and result of each group either online or offline.

**Evaluation Design Section** At the end semester, we design the case study activity rubric for course “Industry System Introduction” so that teachers can evaluate students, group members can evaluate each other, and students can evaluate themselves. After the first round of usage, we modified some of evaluation guide lines.

**Questionnaire Investigation Section** Before the end of semester, we design the questionnaire of “WebCASE usage”, and investigate 22 students from different majors who

are enrolled in course “Industry System Introduction” about the teaching function and case study activity of WebCASE.

Conclusion and Analysis Section After summer vacation in 2006, we began to analyze the 5 original cases which students selected, 6 case analysis reports, and 5 case teaching packages which teachers make after the course, we also collect statistics information according to returned questionnaires.

### 3. Results and Discussion

#### 3.1 About Study Environment

The Study Environment in this paper means the online WebCASE prototype system. Through analysis of questionnaire feedback by 22 students in 6 groups, we find that when asking the question “Are you satisfied with the teaching effect of WebCASE”?, one student chooses extremely satisfied, 15 students choose satisfied, 5 choose not satisfied, and one student choose extremely not satisfied. A total of 16 students, which is 72.7 in all, agree with the good effect Which WebCASE brings, this result shows WebCASE prototype system can satisfy most of investigated persons.

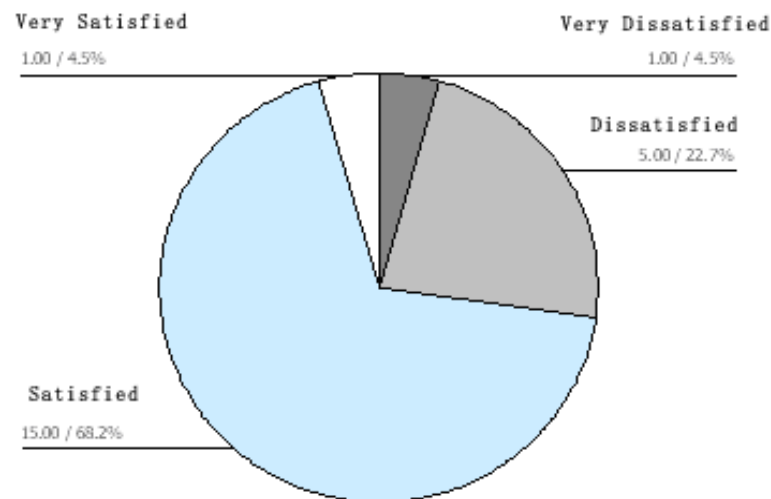


Figure 1 Satisfaction Distribution of WebCASE

During the requirement analysis section, we have found that investigated persons' requirements focus on the functions of Case Index, Discuss Board, Case Report Writing Format Form, and Electronic Documents. In order to verify the effectiveness of functions provided by WebCASE, we design and verify 9 questions in the questionnaire of “WebCASE usage”.

Table 3 WebCASE function usage statistical information

ID	Question	Choices and Selected Numbers			
		Extreme Not Compatible	Not Compatible	Compatible	Very Compatible
1	Check Cases in Case	1(4.5%)	5(22.7%)	13(59.1%)	3(13.6%)

Database Often						
2	Check Case Report of Case Report Database Often	1(4.5%)	8(36.4%)	12(54.5%)	1(4.5%)	
3	Write Case Analysis Report Often	1(4.5%)	13(59.1%)	8(36.4%)	0	
4	Use case discuss board and discuss often	0	6(27.3%)	15(68.2%)	1(4.5%)	
5	Use class discuss board often, and discuss with teachers and classmates	0	13(59.1%)	9(40.9%)	0	
6	Use Group Discuss Board and discuss cases often	0	8(36.4%)	12(54.5%)	2(9.1%)	
7	Conclude study process often and write study notes	0	2(9.1%)	14(63.6%)	6(27.3%)	
8	Often clean up materials during study process	0	6(27.3%)	13(59.1%)	3(13.6%)	
9	Often view other students' study note	1(4.5%)	11(50%)	9(40.9%)	1(4.5%)	

Through the analysis of Table 3, we find that 16 (72.7% in all) investigated persons can often read cases in case database; 13 (59% in all) investigated persons can often read reports from report database; 16 (72.7 in all) can often participate into discussion in the discussing board; 14 (63.6% in all) often participate group discussion; 20 (90.9% in all) often write notes; 16 (72.7% in all) often pack up study materials during study period. These data reflect the high usage of Case Database, Case Report Database, Case Discuss Boards, Group Discuss Board, Study Notes and Personal Files in WebCASE from users' point of view.

From Table 3, we also note that the frequency of writing case analysis reports, participating class discussion, view other students' study note is very low, which indicates a low usage of corresponding functions provided by WebCASE. Through talking to investigated persons, we find this problem comes from two main aspects: one is study mechanism such as formal case analysis reports are only submitted by group leader; the other is there are some system problems with WebCASE in operating and stableness.

Through comparison on case discuss board, class discuss board, and group discuss board, we find investigated persons tend to participate case discuss area with clear topics (16 persons, 72.7% in all) and group discuss area (14 persons, 63.6% in all), but not often participate class discuss area with unclear topics (9 persons, 40.9% in all).

### 3.2 About Learning Object

Here learning Object means the original cases published in WebCASE. They mentioned the appearance which WebCASE exceeds traditional case database is supporting case developing. To verify this concept, we compare and analyze the 5 original cases, 6 case analysis report submitted by students, and 5 case teaching packages, and then we find that: in form aspect, original case implements the evolvement from case to case analysis report, and from case and case analysis report to case teaching package; in content aspect, from case to case analysis report, and from case to case teaching package, questions related are becoming more tiny and deep; in resource aspect, additional extended resources are

enlarging from case to case teaching packages. This result shows original cases in WebCASE are developing during the teaching exchange process.

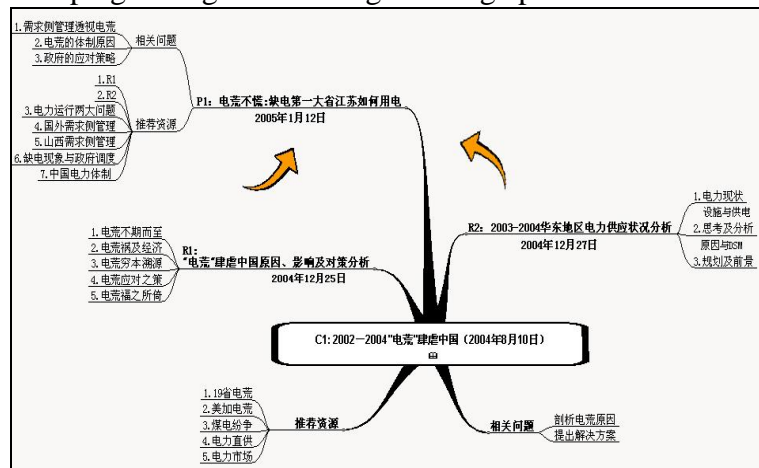


Figure 2 Case Development of "2002-2004 Lack of electricity all over China"

### 3.3 About Study Process

After live observation and analyzing the answers to the question "Please list the process of case study analysis report work in your own group" in the questionnaire, we find group case study activities in 2005 autumn semester commonly will be divided into 6 sections:

Section 1 Case Selection and grouping. In this section, students initially read published cases and recommended resources in WebCASE case database, then selecting cases, grouping and voting for group leaders.

Section 2 Initial discussion and distribution of work. In this section, students will read the case to be studied, and via group discussion, research topics are initially established, and work is distributed.

Section 3 Material collecting and communicating. In this section, group members will collect topic-related materials, and materials are shared in several means such as face-to-face talking, email, sharing resources database.

Section 4 Establish title and syllabus. In this section, group members tempt to find the disagreement place in collected materials which are firstly personally analyzed and then discussed in group, hence title of case analysis report and syllabus will be clearly defined.

Section 5 Case Analysis report writing and publishing. In this section, each group member will afford part of the work in case analysis report according to personal opinions, interests and abilities. Group leader will conclude the analysis report on base of all group members' work. Initial analysis report will be discussed first within group, then after some revise and improvement, then submitted to WebCASE by group leader.

Section 6 Case report meeting and Studying evaluation. In this section, one student from each group will give a presentation which is organized by teachers, and results of each group will communicate in report meeting. Self-evaluating, group-evaluating, and teacher-evaluating will be used together to evaluate students' performance in case study activities.

As an online study environment, the effect of WebCASE in different case study sections can be concluded with aspects such as class management, case deploy, sharing resources, discuss and communicate, study review, and result present.

### 3.4 About Study Evaluation



## 4. Conclusions

This paper introduces the research procedure and result of web-based case studies, including: selection of learning Object, implementation of study proposal, and discussion on study results. The case study activities of 6 groups in course “Industry System Introduction” shows: in study environment aspect, the teaching effectiveness of WebCASE is accepted by 72.7% investigated persons, further analysis shows a high usage rate of functions like case database, case report database, case discuss board, group discuss board, study notes and personal files in system. In studying object aspect, the concept of case developing has been implemented in certain level—in form level, original case implements the deduction from case to case analysis report, from case and case analysis report to case teaching package; in content level, questions related with the process from case to case analysis report, from case to case teaching package are studying further and more detailed; in resource level, resource recommended to students from case to case teaching package are being enlarged; in studying procedure, there are six sections for each group case study activity, as follows: case selection and group, initial discuss and work distributing, material collecting and communicating, making title and syllabus, case analysis report writing and delivering, and case report meeting and study evaluating. In study evaluation, we design the case study rubric to evaluate students’ performance in case study activities according to the principle of multiple evaluated objects, quantitative and qualitative evaluating guide lines.

## References

- [1]. Shuqiang Song, Darong Lu, Jianwei Zhang, and Xueyou Wang. Beyond Case Warehouse: the Design and Realization of a Web-based Case Assisted Study Environment [Z]. Proceedings of 9th Annual Global Chinese Conference on Computers in Education, 511-519, 2005.
- [2]. Jianwei Zhang, Yanqing Sun. Constructive learning: Integration Exploration of Learning science [J]. Shanghai Education Publishing Company, 2004.
- [3]. Brown, A. L. (1992). “Design experiments: Theoretical and methodological challenges in creating complex interventions [J],” *Journal of the Learning Sciences*, vol.2(2),141-178.
- [4]. Collins, A. (1992), “Toward a design science of education [J],” In E. Scanlon and T. O’Shea, eds. *New directions in educational technology*, New York: Springer-Verlag, 15-22.a
- [5]. Dongxing Jiang; Jicai Zhang; Nianlong Luo. “The Current Status and Corresponding Strategies on Higher Education Institute’s Network Education [J]” ,*Computer Education*,2004,(9),44-46
- [6]. Li hui Xu; Deping Zhao; Jiyuan Feng; Qiang Liu. “Research and Implement of Network Aid Educational System Based on B/S Architecture [J]”, *China Construction Education*, vol12(12),16-19
- [7]. Ya-e Dai. “Realization of Computer Assistance Teaching and Office System Based on Lotus Platform [J]”, *Modern Computer*,2007,(12),131-134
- [8]. Meiyan Liu; Meileng Yuan. “Design and Implementation of a Network-Aided Teaching System Based on the J2EE Platform [J]”, *Computer Engineering & Science*,vol29(1),41-44
- [9]. Zhihe Yang.“Design and Implementation of Network Aided Teaching System based on XML [J]”, *Computer Development & Applications*, vol19(3),19-21
- [10]. Yongjuan Yang; Dongbo Cheng. “The Research on Teaching Platform of Network Assistance [J]”, *Computing Technology and Automation*,vol25(4),221-224