

# Critical Issues and Problems in Web-Based Instruction in Higher Education: A Delphi Study

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There has been a considerable amount of professional pressure, and numerous position papers, in recent years expressing both the need for and the hypothetical limitations of Web-based instruction (WBI) in higher education. Thus as universities move toward the use of Web-based education (WBE), there is an increasing need to discover what university professors think about this new instructional environment. This paper attempts to clarify some of the issues and problems facing WBI in higher education in Taiwan. A Delphi method study was conducted in order to identify the issues and problems we face; twenty-seven panels were used in the four-round Delphi to identify these issues and problems. On ten issues and twelve problems a consensus of opinion was reached by the experts. The issues and problems identified were then classified into five categories: (1) theory, which involved two issues and one problem; (2) instruction, involving three issues and three problems; (3) delivery, involving one issue and three problems; (4) environment, including one issue and three problems; and (5) related factors, involving three issues and two problems. It was found that, in an examination of the top five items within the total set of issues and problems, the most prominent ones came under the categories of instruction and delivery.

**Keywords:** Web-based instruction higher education Delphi method

## Introduction

A significant trend in higher education has shown that widespread international acceptance with the increasing popularity of the WBI since mid-1990s. This increasing infusion of web technology is challenging the academic core of higher education. More and more higher education institutions adopted web technology into their teaching and have been proclaiming their success. Over the past several years, many college and university faculty in Taiwan have also developed courses or course components for delivery to students over the web. Thousand of educators are creating web

pages for their courses, complete with syllabi, assignment, reading material, and links to appropriate resources. However, university professors are also getting the pressure to become web-savvy and started focusing on how to put their classes on the web (Abbey, 2000). As a result, more and more concerns were raised on the quality and efficacy of the instruction being delivered in this manner. As Brace-Govan and Clulow (2000) indicated, for many universities and their students, the concept of WBI requires substantial re-thinking about what is involved in teaching and

learning, what expectations might be reasonable, and how this can best be accommodated in a web-based environment. In other words, web technology undoubtedly has offered many benefits for the learners and instructors, however, the pitfalls need careful consideration in the design of the learning environment (O'Donoghue, Singh, & Dorward, 2001).

The last ten years have seen the widespread development of digital processing and communication coupled to networked computing. This has opened up a broad set of teaching and learning opportunities, allowing a new emphasis on interaction and concept exploration in higher education. Web technologies provide unique opportunities for higher education faculty to rethink the resources that are available to re-envision their pedagogical techniques. The Web is a distribution channel with powerful capabilities that permit immediate dissemination of – and access to – audio, video, graphical, and textual information and interactivity. WBI is a concept born from the sophisticated technologies permitting interactive communication between learners and teachers and transmission of information at a distance. Due to rapid development, it is predicted that WBI will be a major growth area for education in the future. We argue that since web-based delivery is likely to become mainstream in higher education institutions, it is worth looking at the way it is being implemented in order to better understand its nature and contribution to teaching and learning in higher education.

## Higher Education and Web-Based Instruction

The Internet is likely to form the backbone of the Knowledge Economy in the 21st century, and will also enable and require new models of education. There is no

question that the need for higher education will become increasingly important in this knowledge-driven future. Education must be knowledge based, and strategies to develop and implement them must incorporate educational environments on the Internet and WWW that are specially customized to support knowledge work and collaborative learning (Harasim, 1997). Therefore, it is not surprising that colleges and universities will be greatly affected by the rapid advances in web technology. Since access to higher education can be available from a number of institutions via web technology. Students will have the choice of enrolling in course and earning degrees from multiple institutions without ever leaving their homes. As a result, the control of higher education will have shifted from the providers to the students. Students will shop for institutions that provide the most efficient and most learner-centered services.

Another aspect of higher education is now facing the challenging of students' call for lifelong learning for their personal development. The push towards lifelong learning in higher education is creating a steady increase in part-time, working students seeking additional credentials who may perceive the online opportunity as a way to fit study into their busy schedule (Brace-Govan & Clulow, 2000). With the increasing popularity of Internet, WBI is now getting more and more popular in higher education. Through different web learning platforms, students can now study whenever they need.

Clearly, the ever-increasing diversity that characterizes higher education makes it clear that there will be many forms of institutions serving our students. But, as Duderstadt indicated, there are a number of themes that will almost certainly characterize at least some part of the higher education (Duderstadt, 1999, p.22-23):

1. A shift from faculty-centered to learner-centered

institutions. The academy will join other social institutions in the public and private sectors in recognizing that we must become more focused on those we serve.

2. **Affordability.** Higher education will be within reach of all citizens, whether through lowered costs or societal subsidies.
3. **Lifelong learning.** This will reflect both a desire to continue to learn on the part of our citizens and a commitment to provide opportunities for this lifelong learning by our institutions.
4. **A seamless web.** All levels of education will not only become interrelated but also will blend together, with learners no longer progressing in lock-step fashion from one level to the next but instead accessing multiple levels of education throughout their lives as their needs change.
5. **Asynchronous learning.** The constraints of time and space will be broken to make learning opportunities more compatible with learners' lifestyles and needs.
6. **Interactive and collaborative learning.** Learning approaches will be appropriate for the digital age, the "plug and play" generation.
7. **Diversity.** Higher education will serve an increasingly diverse population with diverse needs and goals.

Just as the Taiwan economy has moved away from the industrial model to one that is information based, technology intensive and decentralized, so will higher education have to be changed. Many higher education institutions in Taiwan adopted web technology into their teaching and have been proclaiming their success. National Taiwan University has offered more than four hundred asynchronous web courses since 1997. In 1998, eighteen higher education institutions joined together and provided their island wide students with more than sixty courses on web, including science, education,

management, engineering, law, and social science. Moreover, many universities start offering degree for those using web as a delivery channel, for example, National Chiao-Tung University offers degrees programs of e-learning. All these indicated that the concepts of using web as a delivery tool is getting acceptable in Taiwan. However, considering the amount of money and efforts being expended in those universities on infrastructure, software, training and technological pedagogy, the lack of understand problem and issue of WBI is unconscionable. As the report provided by the Ministry of Education in 2001 indicated that the general problems of WBI that challenging higher education in Taiwan included insufficient money support and support from administration, high cost of developing web-based courses, lack of learning platform on web, web resources were not integrated, etc. (Ministry of Education, 2001).

## Issues and Problems in Web-based Instruction

While enrichments of instructional quality are made possible by using web in higher education, their pervasiveness requires examining the notions of students, courses, curricula, and other tradition bound instructional concepts and processes. Many advocates of WBI emphasize its positive aspects and understate the kinds of communicative and technical capabilities and work required by students and faculty. In fact, the differences between WBI and face-to-face learning do not end with communication issues and the distance separation of learners. As Brace-Govan & Clulow (2000) noticed that there were also issues linked to how students actually go about working in this electronic environment. Do students adapt their study habits to accommodate electronic delivery of materials? What

differences of learners notice between learning through traditional means and learning through web?

From an instructional aspect, putting content on a web page is no guarantee of learning. The Web may be a great way to distribute information, but can we really teach with it? There is a big difference between information and instruction, and this basic principle is as true on the web as anywhere (Foshay & Bergeron, 2000). Sound WBI should be the result of effective communication and instruction and adherence to coherent instructional principles. In other words, it is necessary to follow the key elements of the structure of WBI, as Jung (2001) indicated, which includes content expandability, content adaptability, and visual layout. From learning's perspective, instructional design is a way to plan learning sessions that feature interaction, learner control, and mutual feedback. The World Wide Web (WWW) presents itself as a primary information delivery vehicle and an educational communication system with potential to facilitate the learning process (Ei-Tigi & Branch, 1997). From teaching's perspective, it is crucial for decision-makers to consider pedagogical issues in providing appropriate WBI. As Chen (1997) suggests the focus should be on the interaction between instructors and learners, instructional strategies, motivation, and feedback/evaluation.

In fact, the use of WBI is still new to both instructors and students in higher education. Some of the problems that exist in instruction need to be given a special consideration. As Hillesheim (1998) noticed that literature review determined problems to success in online program fell into three general categories. The first is related to characteristics of the students themselves. For example, students not only want to a "just in time" education, they but also seek a "just for you" customized education. Thus the WBI venture will

need to continually become more personalized for students. Second, the relationship and communication between students and faculty is an area of influence on student success. As indicated, when web-based communication between students and faculty was first studied it was suggested that there would be significant changes to the sociological and psychological processes of communication (Rice, 1994). It is crucial that there should be some consideration of student needs for communication and supports from appropriate others, such as instructors, peer group and technicians. This consideration strongly suggests that the need for instructor to pay attention to the emerging types of interaction which include academic interaction, collaborative interaction, and interpersonal interaction (Jung, 2001). Third, is the problems related to the technology for the online courses. It is essential that we place pedagogy above technology. Students do not learn from the technology, they learn from competent instructors who have been trained how to communicate through the technology. Knowing what the strengths and weakness of the delivery technology, we can capitalize on the advantages and minimize the restrictions. In fact, all three categories above indicate that interaction is a key issue and problem in WBI. In an electronic learning environment, maintaining interaction is difficult but not impossible. We must recognize the importance of this interaction and employ techniques to encourage it to happen. Some of the techniques, as suggested, are: establish a learner-centered environment, but a "guide by the side" not a "sage on the stage", provide regular and meaning feedback, ask for and heed student feedback, and make provisions for student-to-student interaction (Lau, 2000).

Several studies indicated that the reason of high dropout rate of WBI courses come from lacking of

incentives, lacking of accountability for course completion, and the inability of poorly designed courses to keep students' attention (Skipper, 2000). In a recent study conducted by Yang and Hwu (2001) also indicated several issues needed to be concerned in WBI, which included administration issues – money support and well-planning to support an online distance education innovation; technology issues – need the reliability of system and bandwidth; instruction issues – intentional interaction, quality content and participants' attitude are the factors which affect the performance of an online program. Another aspect related to the instruction issue is the faculty motivation and commitment toward web-based teaching. As the study conducted by Lee (2001), it was shown that faculty motivation and

commitment were higher in the higher education institutions with well-provided instructional support. All these indicate the importance of training and administration support needed for higher education faculty.

Recently, the creation of WBI is being driven by market forces as well as by technological innovation. The need for more continuous education is increasing at the same time that most of institutions are looking for ways to expand their educational markets in Taiwan. More and more web-based courses are developed and used in our educational system. It is the time to give a serious concern about the issues and problems that are going to affect the field. This paper focuses on the issues and problems of WBI, and intends to provide a list of the items that concerns need to be paid.

## Purpose of The Study

The purpose of this research was to determine the present critical issues and problems facing the WBI in higher education. WBI was defined as: A hypermedia-based instructional program which utilizes the attributes and resources of the WWW to create a meaningful learning environment where learning is fostered and supported (Khan, 1997). A critical issue was defined as: Of crucial importance relating to at least two points of view that are debatable or in dispute with

WBI. A critical problem was defined as: A crucial impediment to the progress or survivability of WBI. The following research questions were developed for investigation:

1. What are the critical issues that are currently impacting on the WBI in higher education?
2. What are the critical problems that are currently impacting on the WBI in higher education?

## Methodology

Identifiable issues and problems were collected from a group of WBE professionals using a Delphi technique designed by Dalkey and Helmer (1963) and revised by Delbecq, Van deVen, and Gustafson (1975).

The Delphi technique was developed by the Rand Corporation during the 1950's. Since that time, the popularity of the technique has grown in the use of public policy analysis, educational innovations, program

planning, and a number of other applications (Baker, 1988). Its emphasis is to develop expert consensus on a specific topic through a use of three to five questionnaires. This study used a four round Delphi process to ascertain and prioritize the critical issues and problems in WBI. Descriptive and ordinal level data collection and analysis was used to interpret group suggestions and opinions into a collection of descriptive information for decision-making.

In order to address the research questions, the respondents would need to reflect on their experiences in an ongoing way. The research objectives were exploratory in nature and most benefit would be derived from allowing the respondents the broadest scope for response and a generous amount of time for reflection. The clear intention for this study was to uncover respondents' experiences to inform any later studies in WBI. Thus, the researcher believed that Delphi was an appropriate methodology for this study.

## Sample

The group selected for this study was composed of 27 panelists, including 18 male and 9 female, from 18 major universities in Taiwan, including 10 public universities and 8 private universities. The group selected represented three regions: north, middle, and south of Taiwan. Because the success of the Delphi technique relies upon the use of informed opinion, random selection was not considered when selecting the Delphi participants. However, demographics and gender were taken into consideration when selecting the Delphi team. Criteria used in selecting the participants was based on their history of involvement in web-based teaching as well as their ability to formulate their thinking through writings and researches. A letter explaining the purpose and objectives of the study was mailed to 27 of the experts

identified in the panel selection process. All of the 27 agreed to participate by returning a self-addressed post card with their signature indicating their willingness to be a part of the study. The sample size of 27 fell within the range recommended by Delbecq, et al. (1975). This study was conducted during March to June of 2001.

## Instrumentation

The Delphi technique consists of one or more rounds of open-ended questionnaires to poll original statements from respondents, with follow-up rounds of questionnaire directing the respondents to rate their statements for importance in relation to each other (Cyphert & Gant, 1971). A four probe Delphi technique was used to conduct the research for this study. A series of four questionnaires was mailed to the 27 experts. The panel was provided a cover letter describing the process they were to follow plus definitions for the terms: WBI, critical issues, and critical problems.

The first Delphi probe asked the panel, an open-ended question, to identify exhaustively the critical issues and problems for WBI using the two guiding questions created for the panelists. The statements from the first round provided the basis for the second questionnaire. The second probe of the Delphi was designed to prioritize the identified issues and problems and begin the process of consensus. The third and fourth probe sought to improve the levels of consensus on the highest priority issues and problems.

## Procedure

### Delphi I

The first questionnaire served as a beginning point for the study. Panel members identified a total of 103 items, including 45 critical issues and 58 problems for WBI. Based on the total number of identified issues and

problems submitted, key descriptors were identified from each entry and then grouped according to like classifications under each section of the study (issues and problems).

A review panel composed of two college professors and one graduate student were invited to help researchers identifying the key descriptor for each of the 103 statements. Upon completion of the classification process there were 10 items in the issues section, and 12 items in the problems section. These classified items formed the basis for the critical issue and problems were evaluated further during the second and subsequent Delphi probes.

### Delphi II

The purpose of the second questionnaire was to determine the relative rank or priority of the items identified under each of the sections. Panelists were asked to select the 10 most critical issues and 12 problems from the collapsed category list within each section. They were then asked to prioritize those items from “1 to 10 or 12” with ‘1’ being most critical and ‘12’ least critical. Analysis of the responses involved a summation of each of the items along with consensus analysis within the specific sections. A group value was determined for each statement by assigning a value of 12 to each “12” rank, 11 to each “11” rank, 10 to each ‘10’ rank, and one to each “1” rank.

### Delphi III

The purpose of the Delphi III was to gain greater consensus of the top 10 critical issues and 12 problems facing the WBI. Based on the responses from probe 2, the panel members were asked to refer to their previous analysis and compare them with the identified top 10 issues and 12 problems of the overall group. The priority rank that each panelist had assigned in Delphi II was listed on the survey, and the panelists were asked if they still agreed with their choice. If there were disagreements, the panelists were instructed to make changes and justify all responses.

### Delphi IV

The consensus process was refined further during the fourth probe of the Delphi Panel members were asked again to examine their previous responses with regards to the overall group responses of the critical issues and problems and to make a final judgment as to their priority of criticism relevant to WBI.

Descriptive statistics were used to analyze the data; critical issue and problems priorities were rank ordered; means and standard deviations were calculated for each item identified on the Delphi probes. Each probe of the Delphi was completed by all of the 27 participants thus yielding a 100% return rate.

## Analysis of Findings

The presentation of findings is arranged with the results of each of the Delphi probes. Information about the response data, comments and justification for the panelist’s choices, and the analysis procedures are included for each probe. The final section presents the findings of the analysis of the Delphi IV where the criticism was given a final priority rank.

### Delphi I

This open-ended question allowed the participants to respond freely without limitations. The instrument was design to obtain information to establish the criticism that characterize the issues and problems facing WBI in colleges, therefore, all responses were

considered important. The Delphi participants generated a total of 103 criticisms, including 45 critical issues and 58 problems. The key descriptors in Table 1, of the criticism in issues and problems were sorted into 10 or

12 categories of like responses by a review panel of three persons. A list of the 10 statements in issues and its context can be found in Table 2, and 12 statements in problems and its context can be found in Table 3.

Table 1 Key Descriptors Used to Group Questions in Critical Issues and Problems

Key Descriptors in Issues	Key Descriptors in Problems
1. Research	1. Intellectual property and protection
2. Teaching style	2. Teacher training and support
3. Methodology	3. Cost of developing course
4. Multicultural resources	4. Interaction
5. Alliance and partnership	5. Administrative support
6. Recruitment	6. Research base
7. Business and industrial support	7. Learner's motivation
8. Evaluation	8. Assessment
9. Philosophical theory	9. Collaborative learning
10. Learning environment	10. Online privacy and protection
	11. Course preparation and delivery
	12. Use of technology

Table 2 Critical Issues in Web-based Instruction (Delphi I Responses)

Synopsis	Detailed Context
Clear research base and agenda for WBI	Some argue that a clear research base and agenda for WBI is needed in the profession. While some treat WBI only as a supportive learning system and no need to set up additional research base.
Changing from face-to-face instruction to WBI	Some people in the professional believe that WBI can replace face-to-face instruction, while some argue that WBI is only a supplementary instruction in the use of computer technology.
Methodology strategies for teaching web-based courses	Some urge that attention needs to be paid on instructional strategies when teaching a web-base course. While some think that there was little difference in instructional strategies between WBI and face-to-face instruction.
Development of global and multicultural resources	Some urge that there is a need to spread common culture and values in learning to facilitate the growth of globalization when facing the challenge of knowledge and skill competition internationally.
Creation of global alliance and partnerships	Although the global alliance and partnerships are an outgrowth of strategy within higher education, many professionals in WBE still concerned about the losing of curriculum independence and control of students.
Recruitment of students and teachers into WBE	The most discouraging symptom of WBE is the very high dropout rate from students and low incentive to teachers. The argument is the convenience in learning (anytime and anywhere) turn into not now, maybe later, and lacking a dynamic instructor and sufficient incentives.
Business and industrial support for WBE	Although many corporate learning centers have entered into partnership with conventional universities to offer their employees customized training programs, there still has argument of the need to support or involve with higher educational institutes.
Defining measurable outcomes for learners	Some argue that it is not easy to evaluate the efficiency of student's learning, in both the product of learning and reaction to learning process in a web-based environment.
Establishing philosophical theory of WBI	To establish a philosophical theory for WBI becomes an urging issue for the profession. While some believe that WBI is only one of the approaches to conduct instruction, environment difference cannot be the reason for theory establishment.
Design of learning environment	To be most effective in learning in a web-based environment, course offerings must provide students with a credit virtual environment. On the contrary, some believe that web-based learning is only an information-oriented resources system, there is no need to put efforts on the design of web-based learning environment.

Table 3 Critical Problems in Web-based Instruction (Delphi I Responses)

Synopsis	Detailed Context
Lack of intellectual property and protection	Many higher education professors spend hundreds of hours creating new material for online delivery. However, problems concerning copyright and ownership of these materials are often not taken considerably.
Insufficient teacher training and support	Insufficient training and supports were often the problem raised by university professors. These trainings and supports include preparation of materials, detailed attention to learner questions, facilitating peer-to-peer interaction and continuous guiding of learners.
High cost of developing web-based courses	Many professionals in WBI complained the time and cost are so high when conducting a web-based course, which make many professors resist to implementing WBI. The argument indicates that "scale-up" is a possible solution to increase the student/faculty ration and to decrease the cost of developing courseware.
Insufficient interaction between learners and teacher	Although e-mail, BBS, and chat room are available to students, they still had difficulties with online courses and felt that they needed to be with a live person. In order to make a new friendship with other students and teachers, majority of students still favor face-to-face interaction.
Inaccurate understanding and support by administrators	Lack of support and inaccurate understanding from administrators usually are the problems that university professors have to deal with. Without an appropriate administrative support, some basic network infrastructure and software cannot be fully supplied.
Insufficient research base for WBI	More research base for WBI is needed to support the instruction theory in an electronic environment. At this moment, there are not enough research findings to support this innovative instruction.
Lack of learner's motivation and active learning	Without an appropriate supervision from instructor in a web-based environment, many students will easily loss their motivation and learning schedule. In another word, in an self-path and self-controlled learning environment, students usually do not know how to proceed their learning.
Inadequate assessing learner's performance	A continuous dilemma for instructors of WBI classes is whether to utilize online testing or portfolio to assess student's performance. The consequence of online testing or portfolio, though, is that the instructor can never be sure if the students actually took the test or complete the portfolio.
Insufficient collaborative working and learning relationship with others	The beauty of WBI is to form good working and learning relationship with others. However, most of students in this country did not feel involved in taking an active part at a web-based group environment. Students prefer viewing lectures instead of engaging in small group discussion or interactive question and answer.
Lack of online privacy and protection	An open learning environment has caused the problems of lacking of individual privacy. Also, learning community often ignores communication protection.
Insufficient knowledge in course preparation and delivery skills	In general, web-based instructors are lack of knowledge in course preparation and delivery skills. Often, this is because of courseware and facilitation is not keeping pace with technological innovation.
Insufficient use of technologies	Students new to a particular technology may initially exhibit some concern about the role of technology in the learning experience. It was found that the difficulties of using web technology, by both teacher and student, had caused learning and communication frustration.

## Delphi II

The responses that identified the statements in Delphi I provided the design for the second questionnaire. The purpose of Delphi II was to prioritize the 10 statements in issues and 12 statements in problems generated in Delphi I to determine the relative rank of each. It also allowed the participants the opportunity to generate additional criticism that was not considered in

the first probe. Even though this option was given, there were no additions to the 10 or 12.

Ranking points were determined by a point system which assigned 12 points for a ranking of "12", 11 points for a ranking of "11", etc. This procedure allowed the 10 statements in issues and 12 in problems to be placed in a priority rank to determine the most essential issues and problems. The priority ranking in issues and problems of the second probe can be found in Table 4 and Table 5.

Table 4 Delphi II Priority Rank of Issues in Web-based Instruction

Rank Points	Rank	Priority Statement	Mean	SD
76	1	Methodology strategies for teaching web-based courses	2.81	1.84
86	2	Design of learning environment	3.19	2.01
89	3	Establishing philosophical theory of WBI	3.30	2.55
95	4	Defining measurable outcomes for learners	3.52	2.89
127	5	Changing from face-to-face instruction to WBI	4.70	3.78
154	6	Creation of global alliance and partnerships	5.70	3.43
176	7	Clear research base and agenda for WBI	6.52	4.07
194	8	Business and industrial support for WBE	7.19	4.44
234	9	Recruitment of students and teachers into WBE	8.67	3.59
254	10	Development of global and multicultural resources	9.41	3.09

Table 5 Delphi II Priority Rank of Problems in Web-based Instruction

Rank Points	Rank	Priority Statement	Mean	SD
115	1	Insufficient knowledge in course preparation and delivery skills	4.26	4.08
131	2	Insufficient teacher training and support	4.85	4.58
139	3	Insufficient interaction between learners and teacher	5.15	4.62
149	4	Lack of learner's motivation and active learning	5.52	4.78
155	5	Insufficient research base for WBI	5.74	4.80
168	6	Insufficient collaborative working and learning relationship with others	6.22	4.61
170	7	High cost of developing web-based courses	6.30	5.02
181	8	Inadequate assessing learner's performance	6.70	4.49
194	9	Inaccurate understanding and support by administrators	7.19	5.40
215	10	Insufficient use of technologies	7.96	4.89
239	11	Lack of online privacy and protection	8.85	4.05
250	12	Lack of intellectual property and protection	9.26	4.71

### Delphi III

The third Delphi questionnaire was designed similarly to the second questionnaire. The results of Delphi II provided the design, with the 10 most essential statements in issues and 12 in problems ranked by the points received. The instrument also provided the

panelists with the rankings that they assigned to the issue and problem statements in Delphi II for a reference. Space was placed beside each statement for the panelist to make comments to express their thoughts and justify the reason for their decision. The priority ranking in issues and problems of the third probe can be found in Table 6 and Table 7.

Table 6 Delphi III Priority Rank of Issues in Web-based Instruction

Delphi II Rank	Rank Points	Delphi III Rank	Priority Statement	Mean	SD
1	68	1	Methodology strategies for teaching web-based courses	2.52	1.53
3	79	2	Establishing philosophical theory of WBI	2.93	1.98
2	80	3	Design of learning environment	2.96	2.01
4	94	4	Defining measurable outcomes for learners	3.48	3.41
5	128	5	Changing from face-to-face instruction to WBI	4.74	4.05
7	153	6	Clear research base and agenda for WBI	5.67	5.01
6	182	7	Creation of global alliance and partnerships	6.74	5.34
9	204	8	Recruitment of students and teachers into WBE	7.56	5.87
8	239	9	Business and industrial support for WBE	8.85	6.08
10	258	10	Development of global and multicultural resources	9.56	5.43

Table 7 Delphi III Priority Rank of Problems in Web-based Instruction

Delphi II Rank	Rank Points	Delphi III Rank	Priority Statement	Mean	SD
1	103	1	Insufficient knowledge in course preparation and delivery skills	3.81	3.03
3	120	2	Insufficient interaction between learners and teacher	4.44	4.18
2	131	3	Insufficient teacher training and support	4.85	4.05
4	145	4	Lack of learner's motivation and active learning	5.37	4.57
5	153	5	Insufficient research base for WBI	5.67	4.67
6	166	6	Insufficient collaborative working and learning relationship with others	6.15	4.91
8	169	7	Inadequate assessing learner's performance	6.26	4.56
7	189	8	High cost of developing web-based courses	7.00	4.69
9	211	9	Inaccurate understanding and support by administrators	7.81	5.48
11	229	10	Lack of online privacy and protection	8.48	4.45
10	238	11	Insufficient use of technologies	8.81	4.85
12	252	12	Lack of intellectual property and protection	9.33	4.49

## Delphi IV

The purpose of the fourth questionnaire was to reach a final closure of the most essential statements for the issues and problems in WBI. The questionnaire was designed similarly to the third questionnaire. The results of Delphi III provided the design, with the 10 most

essential statements in issues and 12 in problems ranked by the points received. The instrument also provided the panelists with the rankings that they assigned to the issue and problem statements in Delphi III for a reference. The priority ranking in issues and problems of the final probe can be found in Table 8 and Table 9.

Table 8 Final Results of Delphi on Critical Issues in Web-based Instruction

Rank	Priority Statement
1	Methodology strategies for teaching web-based courses
2	Establishing philosophical theory of WBI
3	Design of learning environment
4	Defining measurable outcomes for learners
5	Changing from face-to-face instruction to WBI
6	Clear research base and agenda for WBI
7	Creation of global alliance and partnerships
8	Recruitment of students and teachers into WBE
9	Business and industrial support for WBE
10	Development of global and multicultural resources

Table 9 Final Results of Delphi on Critical Problems in Web-based Instruction

Rank	Priority Statement
1	Insufficient knowledge in course preparation and delivery skills
2	Insufficient interaction between learners and teacher
3	Insufficient teacher training and support
4	Lack of learner's motivation and active learning
5	Insufficient research base for WBI
6	Insufficient collaborative working and learning relationship with others
7	Inadequate assessing learner's performance
8	High cost of developing web-based courses
9	Inaccurate understanding and support by administrators
10	Lack of online privacy and protection
11	Insufficient use of technologies
12	Lack of intellectual property and protection

## Conclusions

The purpose of this research was to determine the critical issue and problems facing the WBI in higher education. Each of the two research questions were addressed and resulted in the identification of the 10 critical issues and 12 problems confronting the WBI. The Delphi team members that identified these issues and problems were in overall agreement as to their character and rank order of priority. Furthermore, the

aim of this study has been to stir rather than settle issues and problems. Part of the message is to call for academics making a more active role in transforming higher education. The following conclusions are based on the research questions defined for the study.

### Issues in WBI

Ten statements reached a consensus of opinion

relative to what will be the issues of WBI in higher education from the panels of experts. It appeared from the data that the issues were described in terms of statements that emphasize instructional concepts and processes. A strong emphasis was placed on the relationships between teaching, learning, and resources as educators interface with a totally new environment.

The panels viewed the statement “methodology strategies for teaching Web-based courses” as the most prior issue of WBI in higher education, followed by “establishing philosophical theory of WBI”, “design of learning environment”, “defining measurable outcomes for learners”, and “changing from face-to-face instruction to WBI” respectively. These statements indicated a strong emphasis on the issues of fundamental theory for WBI and issues of teaching and learning in web-based environment. Also, there was relatively strong support for change of the necessity of more research base for WBI. Little emphasis was placed on business or industrial support and developing multicultural resources.

The development of WBI and the increasing development of online courses have raised many issues concerning the web-based environment. In an attempt to explain the findings, it is informative to note that the university professors in Taiwan seemed to concern about arguments of the philosophical theory and teaching methodology of WBI. This is also referred to the argument that whether web-based environment is really proper for the instructors and students in this country. The web is a great way to delivery information, but the question of “can we really teach with it?” is still concerned by the professions. It is worth noting that the above issues presented have provided caution that the teaching and learning environment was still much under construction, and needed carefully considerations before

implementation. From the issues identified, this study notices that the issues are, in some extent, similar to the classified issues of administration, technology, and instruction as Yang and Hwu (2001) indicated.

## Problems in WBI

Twelve statements reached a consensus of opinion relative to what will be the problems of WBI in higher education from the panels of experts. Collectively, the data in Table 9 indicated that the major problems were based on teaching skills and course development. A strong emphasis was also placed on the relationships between teaching, learning, and resources as educators interface with the new environment.

The panels viewed the statement “insufficient knowledge in course preparation and delivery skills” as the most prior problem of WBI in higher education, followed by “insufficient interaction between learners and teacher”, and “insufficient teacher training and support” respectively. All these statements showed that there were emergent needs for faculty to receive proper instructional supports and training as Lee (2001) indicated. There were also relatively strong supports for the problems of lack of learner’s motivation, active learning attitude, and insufficient research base for WBI. Little emphasis was placed on online privacy/protection, insufficient use of technology, and intellectual property/protection.

Although the asynchronous nature of WBI has provided advantages to students and instructors, this study indicates that problems encountered basically focus on the course delivery and interaction. Many professors have difficult dealing with online courses and the interactions that exist between learners and instructors. From the problems identified, this study approved the findings of these problems were similar to the ones that Hillesheim (1988) indicated.

## General Conclusions

When comparing with the issue/problem classification by Hillesheim (1988) and Yang & Hwu (2001), the issues and problems identified in this study, in general, can be classified into five general categories:

### 1. Theory Aspect

- (1) Establishing philosophical theory of WBI (ranked 2nd in issues)
- (2) Clear research base and agenda for WBI (ranked 6th in issue)
- (3) Insufficient research base for WBI (ranked 5th in problem)

### 2. Instruction Aspect

- (1) Methodology strategies for teaching web-based courses (ranked 1st in issue)
- (2) Defining measurable outcomes for learners (ranked 4th in issue)
- (3) Development of global and multicultural resources (ranked 10th in issue)
- (4) Lack of learner's motivation and active learning (ranked 4th in problem)
- (5) Insufficient collaborative working and learning relationship with others (ranked 6th in problem)
- (6) Inadequate assessing learner's performance (ranked 7th in problem)

### 3. Delivery Aspect

- (1) Changing from face-to-face instruction to WBI (ranked 5th in issue)
- (2) Insufficient knowledge in course preparation and delivery skills (ranked 1st in problem)
- (3) Insufficient interaction between learners and teacher (ranked 2nd in problem)
- (4) High cost of developing web-based courses (ranked 8th in problem)

### 4. Environment Aspect

- (1) Design of learning environment (ranked 3rd in issue)
- (2) Lack of online privacy and protection (ranked 10th in problem)
- (3) Insufficient use of technologies (ranked 11th in problem)
- (4) Lack of intellectual property and protection (ranked 12th in problem)

### 5. Related Supports Aspect

- (1) Creation of global alliance and partnerships (ranked 7th in issue)
- (2) Recruitment of students and teachers into WBE (ranked 8th in issue)
- (3) Business and industrial support for WBE (ranked 9th in issue)
- (4) Insufficient teacher training and support (ranked 3rd in problem)
- (5) Inaccurate understanding and support by administrators (ranked 9th in problem)

From the above identification of the critical issues and problems in WBI, several trends surfaced. In an examination of the top five items within the issues and problems of this research, the most prominent items, in a great part, were the aspects related to web-based instructional strategies and delivery approaches. This indication of instruction concerns was evidence of the emergent need to establish a web-based instruction/learning theory in order to provide an innovative learning environment for higher education. Also, the delivery approaches need to be carefully concerned in order to establish proper communication channels between learners and instructors.

From the issues and problems identified in this study, it was also indicated, in some extent, that the tendency of shifting from faculty-centered to

learner-centered has been carefully considered by high education faculty. The higher education institutions in Taiwan have also shown their concerns, using web as the tools, in serving diverse population with diverse

needs and goals. Clearly, the themes of higher education, as indicated by Duderstadt (1999), have been, in some extent, implemented in Taiwan by taking the advantages of web technology

## Implications

The issues and problems identified in this study can serve as a foundational basis for future development efforts as well as evaluation criteria in WBI. Based on the findings the following implications are put forward:

1. Web-based instructional strategy should be given priority in further study. Also, greater emphasis should be placed on the development of the research base for WBI. The need to further identify the instructional theories and concepts of WBI must be addressed in order to move forward as a legitimate instructional approach.
2. Web-based instruction depends on a number of factors, such as administrative support, technical knowledge and expertise of the instructor, technical support offered by the school, and the school's technical infrastructure. Therefore, attention has to turn to the problem of costing WBI, though as yet little progress has been made in this country.
3. Learner usually will have trouble comprehending information if he or she has to adapt to an unfamiliar learning environment. As a result, learner's interaction should be given prior consideration when teaching in a web-based environment. Although some differences in interaction are identifiable (Jung, 2001), there are steps and procedures that an instructor needs to take to encourage interaction between instructor and students. Furthermore, considerations need to be paid on increasing students' opportunities for learning, and improving students' overall satisfaction with the course.
4. Although the Web is thought of as a highly interactive medium, Web courses are often presented on static pages. The learner has no more interaction than turning the pages of a textbook. Interactive immediacy, as LaRose and Whitten (2000) suggested, needs to be carefully considered to create an atmosphere of closeness.
5. The success of WBI is hinged on the understanding of the nature and characteristic of WBI by both of instructor and student. University professors have tended to teach the way they were taught, so the standard lecture presentation and other instructional approaches have always seemed nature to them. On the other side, students need to know how to work in a web-based environment, how to adapt their study habits, and how to differentiate traditional learning and web-based learning as Brace-Govan & Clulow (2000) indicated.

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# 高等教育的網路化教學之議題與問題

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網路化教學在高等教育中已逐漸顯現其盛行的風氣，愈來愈多的相關的研究也顯示了大學教授開始感受到如何應用網路科技在其教學上的壓力。本研究嘗試探討目前在台灣高等教育中實施網路化教學所面臨的議題與問題，研究係透過德懷術來取得二十七位大學院校教授對這些議題與問題的共識。研究結果顯示，目前在高等教育實施網路化教學所面對的有十項議題及十二項問題，急待釐清與克服。而這些所探討出的議題及問題大致屬於五個型態面：(1)理論面，含二個議題及一個問題；(2)教學面，含三個議題及三個問題；(3)傳輸面，含一個議題及三個問題；(4)環境面，含一個議題及三個問題；及(5)相關支援面，含三個議題及二個問題。在檢視這些議題及問題中，研究結果顯示較受關注的前五個議題及問題，多係屬於教學面及傳輸面的範圍。

**關鍵詞：**網路化教學 高等教育 德懷術

