

Quality Indicators of ICT-Related Support for Blended-Learning in Traditional Universities

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Abstract

Campus-based universities have provided face-to-face instruction traditionally. But recently, it is becoming a trend that they provide blended learning which combines e-learning and f2f instruction. Therefore, traditional university has been installing the ICT related convenience for the faculty and students to use easily to their classes. The purpose of this study is to develop quality indicators of ICT-related support for proper blended learning in traditional campus-based universities. This indicators are used for measuring the quality of ICT-related services at university level for quality education. To this end, first, we reviewed literature about quality indicators of university evaluation and e-learning. Second, we did case study. We selected and analyzed one university for a case, And we identified what elements are perceived important to faculty for more efficient use of technology to their class. Third, we summarized all this data and established the quality indicators framework of ICT-related components for blended learning

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in campus-based universities. Then, these indicators were revised after the expert evaluation. And then 10 experts and practitioners scored importance rating. Finally, we sum them up to 17 indicators and 48 sub-indicators in three phases (input, process, output). Among them, e-learning related organization or body, usability of Learning Management System, and quality assessment system got the highest scores. These indicators are supposed to contribute to measure the quality of ICT-related environment for blended learning and to provide informations about what is required for efficient blended learning in the campus-based universities.

Keywords : quality indicators, blended learning, e-learning, ICT-related support, traditional university

I . Introduction

The use of e-learning is becoming as popular as traditional methods of acquiring knowledge and skills. E-learning of higher education in Korea, started with trial runs since 1998, has been spreading from higher education to corporate training. According to the Human Education Resources' data in 2004, there are 15 online undergraduate schools, 4 online graduate schools and so many online education centers. But the use of e-learning is not confined to online schools or centers. It is widely spread into traditional colleges and universities. Many universities have introduced e-learning into traditional class in order to supplement "face-to-face" education and improve the quality of education. Some universities have established e-learning support centers for themselves. Others are supporting e-learning by consortium among the conventional universities. So, in conventional university' courses, there are many level of web use. It ranges from simple web-use, like a bulletin board for discussion, submitting homework, or delivery of lecture notes etc. to a whole web-use like virtual learning. Occasionally some classes are held only in the virtual world throughout the semester. This means that

e-learning could be alternative and supplementary to face-to-face education in conventional university.

Such a wide diffusion of e-learning is originated from its flexibility. The greatest advantages of e-learning are believed to be its flexible, distributed delivery that allows the learner to learn anytime and anyplace. Hannum (2002) claimed that these are logistical advantages. Hannum (2002) points out that e-learning has instructional advantages and economic advantages also. Instructional advantages means that the ability to provide the delivery of rich multimedia (McManus, 1996; Hannum, 2001), the ability of the learners to control aspects of the lessons, the ability of easy and immediate revising, and the ability to include many forms of collaboration (Hannum, 2001). Economic advantages mean the lower-cost of delivery and development compared with CBT or f2f education. In this regard, Jung (1997) claims that e-learning provides more opportunity of lifelong-education, contributes to maximize the cost-effectiveness by sharing the teachers throughout different institutions and can offer high quality education if quality control system works well.

The type of using e-learning at conventional universities is usually “a blended or mixed” style which combine face-to-face education and e-learning. The way of web use is so various in traditional universities. Sometimes the class exists only in web-based environment or system. In this case, students can participate into the classroom activity only by web technology throughout the course. On the contrary, web technology is used just for administrative support such as course registration or achievement results check. They are both extreme of web-use in the courses of traditional university. So, it is natural to exist various type/level of web-use between two extremes in the university.

This is the reason why the ways of e-learning in traditional university is too complex to define in a word. This complexity makes it difficult to define

quality of e-learning and establish the standards of support level of university like what they need to equip and what they should install for blended learning in traditional universities. Therefore, the use level of web in blended learning in most traditional universities relies on the volition and efforts of the individual professor. But this causes the quality problem of education. In spite of this condition, blended learning is becoming universal way of learning in higher education. So it is very urgent for the university to embrace e-learning as important methods for instructional delivery to improve the quality of blended-learning. For this, the university should determine what they have to do and where to invest. As primary step, standards of quality support for e-learning is needed. So, we tried to establish the standards or quality indicators of e-learning support. It will give university's administrator information about what they need and where they should to invest, to improve the learning and instructional environment.

This research aims to develop the frameworks of quality indicators of all aspects of ICT-related support or instructional technology support for blended learning in traditional campus-based university. Theses indicators will help us to assess the quality of the condition for using technology in the course and get the informations about what is need to invest and support for better teaching environment.

II. Methodology

This research aims to develop quality indicators of ICT-related support for teaching in traditional universities. In order to construct the quality indicators of ICT-related support in blend learning situation. We selected one university as a sample and used Delphi technique to achieve consensus on this topic. Delphi technique in this research was a little bit modified. First, The group members was provided with the results of literature review done by researchers. second, attendee of each meeting were different. Third,

the first meetings were held twice. And then, experts and practitioners in this field estimated the importance (full marks: 5points) of each indicator Finally.

1. Literature review

We gathered the literature about the evaluation indicators of traditional universities or on-line universities and then analyzed the evaluation items. We examined the indicators of computerized level test of universities. And we investigated ICT-related documents of a sample university also. On the basis of this review, we draw out the indicators theoretically, grouped into some categories and made a theoretical and preliminary framework of quality indicators of ICT-related support.

2. Delphi technique

We selected a sample university to look into the organizations precisely and to consider the voices of users in practice. We examine the practical situation of using technology for their courses in this university. We collected the concrete and practical informations about ICT-related support for use of technology for better educational services. After that, we used Delphi Technique to achieve consensus between the professors on the topic of ICT-related support. We held the meetings twice.

1) Participants

At first meeting, a facilitator, an assistant and 5 professors attended. A facilitator and a assistant were research members and 5 attendee were experienced and enthusiastic professors in using technology into their classes. The attendee of second meeting except a facilitator and an assistant were different from first meeting. But it was same that the attendee were experienced and enthusiastic professors about using technology into their

classes.

2) Procedure

The meeting was held twice. At first meeting, the attendee were given theoretical and preliminary framework (1st ver.) of quality indicators as a result of literature review, done by researchers. And the attendee expressed their opinions about the essential conditions for more computerized educational services based on the their experience of using technology and the provided handouts about theoretical framework. After the first meeting, the researchers revised the theoretical framework (2nd ver.). And then, the second meeting was held 3 months later. The attendee were provided the revised framework of quality indicators. They proposed their opinions about the essential conditions for more computerized educational services. Their opinions were put together and the framework was revised again (3rd ver.).

3. Validation and Estimation of Importance

The tentative framework of indicators (3rd ver.) were evaluated by 5 experts who were professors or researchers in this field. And then, the framework were revised to final version. Finally, the final version of indicators was estimated by its level of importance how the indicator is perceived to influence on the quality of ICT-related support. This estimation was done by 10 experts, 5 former experts and other 5 practitioners. As a result of this estimation, we eliminated the indicators and sub-indicators which got the score below 3 points (full mark is 5 point).

III. Review of the literature

1. Definition of indicator

Indicators are generally defined as the measurement or sign that indicate specific phenomenon or thought. An indicator is something that helps us understand where we are, which way we are going and how far we are from where we want to be. According to Han, S. W. (1997), indicators are variables that help to measure the changes and to judge simply and inclusively the condition, the change and the balance of system. According to Lee, S. Y. (1998), indicator has normative and technical properties. Normative property means that indicators can be a means for measuring a phenomenon or a state of value in society. Technical property means that the indicators help quantify the magnitude of change of specific phenomenon or thought and give a sign to ordinary person. The ideal indicator is combination of both of characters at appropriate extent. Therefore the ideal indicator give us an information about a problem situation before the situation gets worse and inform us what should be done to fix the problem.

2. Indicators of College or University Evaluation

There are so many versions of indicators related higher education. Domestically, the indicators of Korean Council for University Education and the indicators of Joongang Daily are famous versions. And there are indicators for each educational program such as teacher education program, graduate schools of education, law colleges, medical program and industrial college as well. Internationally the indicators of higher education in OECD, The IMD international business school campus in Switzerland, and US News & World Reports etc. is famous. These indicators are usually used for measuring statistical index.

Seo, M. (1995) presented the variables of efficiency of higher education by factorial analysis. He grouped the variables into the quality of teaching (closeness between professors and students, increasing time of tasks, emphasizing cooperation among colleagues, high expectation of professors, promotion of study by respecting students' various talents and types of study, quick feedback, and active study) and quality of studying experience (experience of library, interaction with professor, activity of lecture, of arts, use of facilities, council of students, experience of composition, of self-improvement, relation of education, scientific experience, experience of living in dormitory, subject of communication, reading and writing, satisfaction of university, and measurement of circumstance of university).

Shin (1996) grouped the quality indicators into three categories: input, process and out-put. Kim, Yuh and Park (2003) divided indicators into input, process and output categories also. Input indicators contain strategy of management, facilities, quality of students & administration. Process indicators include condition of education & research, study of students, interaction between professors and students, effectiveness of management, and environmental circumstance of university. Output indicators include satisfaction, social reputation, employment rate, and relations between learners. However, Oh, Park and, Son (2002) divided the university indicators into six categories: faculty factors, curriculum factors, support system, facilities, climates and future visions, environmental factors. On the other hand, Kim, Y. et. al. (1997) divided indicators into process of education, educational support system of assistance of education, educational achievement and social & economic background. Each of divisions includes 11 subsidiaries. These frameworks of indicators are shown in Table 1. This table shows that all frameworks of indicators involve the variables related to the relations between professors and students. But it is difficult to measure and quantify specific value of the variables.

Table 1. Summary of Quality Indicators of University

Key factors for quality of university. (Shin, H. S., 1996)	U. S. News Indicators and Weights	Framework of education indicators (Kim, Y., et al, 1997)
<p style="text-align: center;"><u>Input</u></p> <p>*Learners' characteristics: entrance grade, school grade, SES</p> <p>*Faculty's characteristics: ratio of class assignment, completion rate of Ph.D, ability for research, payment, a part-time lecturer ratio</p> <p>*Finances and management: finances of University, scholarship, research fund support, education expenses per student, property</p> <p>*Facilities: books and lecture rooms per student, facilities for experiments and practice, demand for dormitory, modernistic facilities for education</p> <p style="text-align: center;"><u>process</u></p> <p>*Educational curriculums and programs: input resources, rationality of curriculum, recognition level of members, flexibility of management, attractiveness, benevolence, agreement, characteristic, effective, effort for revision</p> <p>*Learning : ambition level, functional, support for growth, assertiveness, academic learning time, learners cooperation, expectation and support</p> <p>*Teaching : teacher-student interactions, feedback on time, cognizance level, instructional method, research, student support, consideration of talents and learning styles of learners</p> <p style="text-align: center;"><u>Output</u></p> <p>*Characteristics of learners: learning achievement, ratio of employment, dropout rate, critical thinking ability, social maturity, ability of adaptation, satisfaction of others, attitude toward university, completion rate of graduate school, number of Ph.D., income of graduate, celebrities, entrance-graduation rate, excellence of writing and speech</p> <p>*Characteristics of faculty: publication of books, research, papers and journal, award numbers.</p>	<p>*<u>Academic Reputation (25%)</u></p> <p>- Academic Reputation Survey (100%)</p> <p>*<u>Student Selectivity (15%)</u></p> <p>- Acceptance Rate (15%)</p> <p>- Yield (10%)</p> <p>- High School Standing Top 10% (35%)</p> <p>- SAT/ACT Scores (40%)</p> <p>*<u>Faculty Resources (20%)</u></p> <p>- Faculty Compensation (35%)</p> <p>- Faculty With Top Terminal Degree (15%)</p> <p>- Percent Full-time Faculty (5%)</p> <p>- Student/Faculty Ratio (5%)</p> <p>- Class Size, 1-19 Students (30%)</p> <p>- Class Size, 50+ Students (10%)</p> <p>*<u>Retention Rate (20%)</u></p> <p>- Average Graduation Rate (80%)</p> <p>- Average Freshmen Retention Rate (20%)</p> <p>*<u>Financial Resources (10%)</u></p> <p>- Educational Expenditures Per Student (100%)</p> <p>- Alumni Giving (5%)</p> <p>- Alumni Giving Rate (100%)</p> <p>*<u>Graduation Rate Performance(5%)</u></p> <p>- Graduation Rate Performance (100%)</p>	<p>*<u>Process of education</u></p> <p>- Opportunity of education</p> <p>- Condition of education</p> <p>- Faculty and staff</p> <p>- Facilities of education and circumstance</p> <p>- Tuition fee</p> <p>- Purpose, content, method of - education</p> <p>- Purpose and content of education</p> <p>- Method and evaluation of education</p> <p>*<u>Educational support system</u></p> <p>- Policy and administration of education</p> <p>- Policy of education</p> <p>- Parents of students' participation to education of university</p> <p>- Consciousness of people' education</p> <p>*<u>educational achievement</u></p> <p>- Personal result</p> <p>- Social result</p> <p>*<u>Social and economic background</u></p> <p>- Structure of population</p> <p>- Social and economic background</p>

3. Indicators of online universities evaluation

Online university is one of the distance educational institution, which provides only technology-based distributed learning. The term of 'e-learning' is usually used to indicate the education of online university. In this case, the level of web use in a course is immersive. So the classroom activities are done only in on-line environment. this is the most extreme type of e-learning. But this type of e-learning and the advent of online university based on it provoked the concern about quality problem and accreditation. It was one of the most important issues of online university until recently. Because e-learning of online university has short history, compared with face to-face education, many researchers have got interests on quality indicators and quality management of e-learning system from early stage. there are Ahn, et. al. (2001), Choi, K. A. (2002), Khan (2001), Phipps, R. & Merisotis, J. (2000), Rowntree (1998).

Table 2. Dimensions and Sub-Dimension of Quality Web-Based Educational System from Choi, K. A. (2002).

Dimensions	Sub-dimensions
Quality of web-based education	Flow of information
	Administration and policy
	Course structure and guidance
	Teaching and learning Activity
	Learner and Faculty support
	Interface
	Management
	Legal and ethical issues
	Assessment and evaluation Quality management related policy
Organizational management	Quality management related policy
	Management of human factors
	Course development process
	Technological factors

Khan (2001) divided web-based learning (WBL) into eight dimensions: Pedagogical, Technological, Interface Design, Evaluation, Management, Resource Support, Ethical, Institutional. Rowntree (1998) categorized the rules of quality evaluation into 4 dimensions: management, materials and course design, student support, conclusions and recommendations for quality improvement. Phipps, R. & Merisotis, J. (2000) grouped indicators (or benchmarks) into institutional support, course development, teaching/learning Process, course structure, student support, faculty support, evaluation and assessment. Choi, K. A. (2002) divided quality factors of Web-Based Educational System into educational and organizational factors. To summarize, frameworks of e-learning indicators contain macro/micro dimensions or input/process/output dimensions.

4. Characteristics of Blended learning: Rendezvous of e-learning and face-to-face education

The introduction of web technology into class and other educational environment raises many issues. When faced with prospect or requirement of using the web in the instruction, many people assume that they are being asked to create an online environment for their own. This might be goal of some environment, though it needs not to be the goal of all. Actually there are so many types of web use in higher education. Jones, Harmon, & Lowther (1999) suggested five levels of web use that are common in schools, colleges, and corporations. These levels represent a continuum from basis occasional use to advanced use (Jones, Harmon, & Lowther, 2002). Recently there are courses of all the level of web use in traditional campus-based universities. People in this field call that type of instruction blended learning. From this diversity of e-learning in traditional university, we can guess difficulties of establishment of quality indicators.

The advantages of blended learning have been often commented recently among practitioners and researchers in school learning and corporate learning.

Blended learning means generally to combine or mix modes of instructional technology like web-based technology with face-to-face instructor-led education to accomplish an educational goal. And blended learning also means to combine various pedagogical approaches to produce optimal learning. It means to combine instructional technology with actual tasks, especially in corporate learning. Here it means the mixed mode of e-learning and face-to-face education in traditional universities.

Table 3. Levels of web use in education (Source: Adapted from Harmon, S.W. & Jones, M. G. (1999). The five levels of web use in education: Factors to consider in planning an online course. *Educational Technology*, 39(6), 28-32.)

Level of Web Use	Description
Level 0 : No web use	The default level. Implies no web use at all.
Level 1 : Informational web use	Providing relatively stable information to the student typically consisting of instructor placed items such as the syllabus, course schedules, and contact information. This set of information is easily created by the instructor or an assistant, requires little or no daily maintenance, and takes up minimal space and bandwidth.
Level 2 : Supplemental web use	Provides course content information for the learner. May consist of the instructor-placed course notes and other handouts. A typical example would be a Powerpoint presentation saved as an HTML document and placed on the web for students to review later.
Level 3 : Essential web use	The student cannot be a productive member of the class without regular web access to the course. At this level the student obtains most or all of the written course content information from the web.
Level 4 : Communal web use	Classes meet both face-to-face and on-line. Course content may be provided in an on-line environment or in a traditional classroom environment. At this level students generate much of the course content themselves.
Level 5 : Immersive web use	All of the course contents and course interactions occur on-line. Does not refer to the more traditional idea of distance. Instead, this level should be seen as a sophisticated, constructivistic virtual learning community.

E-learning has the advantages that overcome the limit of time and space, and has potential to be just-in-time education by delivering the modules to anyone, at anytime, anywhere, and maximize the cost-effectiveness. On the contrary, f2f education has different advantages. It could help to promote more corporate culture, more human contact, broader simultaneous transmission in instructional situation, and could deliver all type of material in any subject. So, Kim, S. W. (2001) commented the effectiveness of blending of e-learning and face-to-face instruction. And Kim, M. R. (2000) insists that universities need to use face-to-face instruction and e-learning together.

However, the quality of blended learning in traditional universities is not always satisfiable. It means that we have to prepare carefully all the blended learning related-stuffs to guarantee the quality of education. Despite of this problem, many university does not provide those services and encourage the professors to use e-learning. It implies that the effort for quality management or quality assessment for blended learning situation is really urgent. So, we tried to establish the framework of quality indicators of organizational circumstance for e-learning in traditional university.

IV. Results

We grouped the quality indicators of e-learning in traditional universities into input, process, and output phases according to systems approach. The indicators contained all the components which need to facilitate the use of ICT into class and improve the quality of education. The 1st version of framework was got by literature review. Theoretically 44 indicators are identified and grouped into 11 categories in three phases. After 1st meeting, the indicators like facilities, developing e-learning curriculum, development of multimedia material for a course, management strategy of media, digging and awarding quality e-learning course were added. the importance of each

Table 4. The change process of framework of quality indicators category by the step of Delphi Technique

\ ver. category	1st	2nd	3rd						
Input	<ul style="list-style-type: none"> • Policy about • ICT-related support • Technological support • service support • Institutional management 	<ul style="list-style-type: none"> • Policy about ICT-related support • Technological support • Facilities* • Service support • Institutional management 	<ul style="list-style-type: none"> • Policy & organizations about ICT-related support • Facilities • Technological support • Selection and development of human resources • Faculty support • Learner support • Visions and wills of practice 						
Process	<ul style="list-style-type: none"> • Support system for instructor • Development of e-learning course • Course management • Course contents and structure • Interaction 	<ul style="list-style-type: none"> • Support system for instructor • <u>Developing e-learning curriculum*</u> • Development of e-learning course • <u>Development of multimedia material for course*</u> (providing model) • course management • Course contents and structure • Interaction • <u>management strategy of media*</u> 	<table border="1"> <tr> <td></td> <td> <ul style="list-style-type: none"> • Institutional level </td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> • Program level </td> </tr> <tr> <td>Course level</td> <td> <ul style="list-style-type: none"> • Course design /development • Instructional method • Online-class management • Educational contents and tasks • Interaction </td> </tr> </table>		<ul style="list-style-type: none"> • Institutional level 		<ul style="list-style-type: none"> • Program level 	Course level	<ul style="list-style-type: none"> • Course design /development • Instructional method • Online-class management • Educational contents and tasks • Interaction
	<ul style="list-style-type: none"> • Institutional level 								
	<ul style="list-style-type: none"> • Program level 								
Course level	<ul style="list-style-type: none"> • Course design /development • Instructional method • Online-class management • Educational contents and tasks • Interaction 								
Output	<ul style="list-style-type: none"> • Course evaluation • Feedback system 	<ul style="list-style-type: none"> • Course evaluation • Feedback system • <u>Digging and award of quality e-learning course*</u> 	<ul style="list-style-type: none"> • Satisfaction level of members (professor, student, staff) • Educational result • Cost-effectiveness 						

indicator is estimated by ten experts. We summarized the change process as Table 4. Finally The indicators are grouped into 17 categories and 48 Indicators in three phases. And then, the importance of each indicator is estimated by ten experts. We summarized the result as Table 5.

Table 5. The Framework of Quality Indicators of cyber-education in Traditional University

	Category	Indicators	Importance (Total:5)
Input	Policy & organizations about ICT-related support	-department or body for ICT-related support	4.8
		-Strategy of encouragement for ICT-related support	4.1
		-Budget of ICT-related support	4.3
	Facilities	-Facilities for technology-based teaching and learning	4.1
		-Facilities for developing materials for e-learning	3.7
	Technological support	-Possession of LMS	4.2
		-Capability of LMS	4.8
		-Management system about infrastructure technology	4.2
Selection and development of human resources	-Faculty member	4.1	
	-Teaching assistant for e-learning	4.3	
	-Instruments designer and wed designer	4.0	
	-Network and server specialist and	3.6	
	-Manager for technology-based facilities	3.4	
	-Administrators for e-learning	3.6	
Faculty support	-Technological support	4.6	
	-Instructional design support	4.2	
	-Online research support	3.8	
Learner support	-Online learning support	4.0	
	-Online administration support	4.0	
Visions and wills of practice	-Visions for e-learning	4.6	
	-execution level to budget and organizational innovation	4.3	

Table 5. continued

Category		Indicators	Importance (Total:5)	
Process	Institutional level	-Decision-making process about budget and policy on e-learning	4.0	
		-Marketing and sharing information	3.9	
	Program level	-Curriculum	4.2	
		-Effective management system of teaching assistant	4.1	
		-Technological and administrative support	4.6	
		-Support system of course design and development	4.2	
		-Support of self-evaluation system for courses	4.7	
	Course level	Course design/development	-Practical support of design and development for e-course	4.6
		Instructional method	-Good syllabus and course structure	4.6
			-Use of appropriate media	4.3
			-Adequacy of instructional strategies, Appropriateness tasks or evaluation method	4.4 4.2
		Online-class management	-Level of execution and achievement level of course plan	4.3
-Guidance for students -Procedure of solving user's problems and inconveniences			4.3 4.3	
Educational contents and tasks	-Adequacy and richness of contents,	3.8		
	-Adequacy of tasks and evaluation method	4.1		
Interaction	-Students' accessibility to professors	4.3		
	-Variety of teacher- students interaction	3.9		
	-Facilitating cooperative learning by discussion and team project	4.3		
Output	Satisfaction level of members (professor, student, staff)	-Students' satisfaction level with course	4.3	
		-Professors' satisfaction level with support in the whole process of course.	4.3	
		-Satisfaction level of members with other member's service	4.2	
	Educational result	-Student's achievement level	4.1	
-Career development and employment of graduates -Social reputation		3.3 3.6		
Cost-effectiveness	-Research on cost-effectiveness and good reputation about e-learning	4.1		

Input phase includes 7 categories (educational policy & organizations, facilities, technological support, selection and development of human resources, faculty support, learner support, visions about utilization of e-learning) and 21 indicators. As the results that experts and practitioners scored, indicators like an organization or a department for ICT-related support (4.8), capability of LMS/LCMS (4.8), and vision for ICT-related support (4.6), technological support system were shown to be important. It implies that the vision/will of university, department which executes ICT-related support and LMS/LCMS to service ICT-related support are most important as input variables.

Process phase was divided into three levels (university, program, courses) and includes 20 indicators in 7 categories. Institutional level includes 2 indicators: decision-making process about budget and policy for e-learning, marketing and sharing information. Program level includes 5 indicators: curriculum, effective management system of teaching assistant, technological and administrative support, support for course design and development, and support of self-evaluation system. Finally course level includes 13 indicators in 5 categories: practical support for design and development of each course, planning of course structure and syllabus, use of appropriate media, adequacy of instructional strategies, adequacy of tasks or evaluation method, level of execution and achievement of course plan, guidance for students, procedure of solving user's problems and inconveniences, adequacy and richness of contents, adequacy of tasks and evaluation methods, accessibility to professors, facilitating cooperative learning by discussion and team project, and frequency and variety of interactions between professors and students. Among them, self-evaluation system (4.7), technological and administrative support (4.6), practical support of design and development of cyber-course (4.6), planning of course structure and syllabus (4.6) and adequacy of instructional strategies (4.4) got the high scores in importance level test.

Output phase includes 7 indicators in 3 categories (satisfaction, improvement of educational result, cost-effectiveness). Among 7 indicators, Students' satisfaction

level with course (4.3), Professors' satisfaction level with support in the whole process of course (4.3), Satisfaction level of members with other member's service (4.2), learning achievement (4.1) and cost-effectiveness (4.1) are evaluated to be important. This result implies that the major purpose of using cyber education in traditional university is located in the improvement of satisfaction of users, especially professors and learners.

V. Conclusions and implications

This study developed the frameworks of quality indicators of ICT-related support in traditional universities. These frameworks of quality indicators include all the components which are related to execute ICT-related support in campus-based universities. Indicators are categorized into input, process, output phase, and especially process indicators are divided into institutional, program and course level. Finally, this study proposed 48 indicators in 17 categories. This study also resulted that the indicators such as ICT-related support organizations, visions, LMS/LCMS, and technological support system in input phase and such as self-evaluation system, practical support of course design and development the process phase were estimated more important. This result indicates that the technologically well- provided environment and systematic support are perceived to be more important for the university still now to mix or combine ICT-related support with f2f instruction.

On the basis of the result, we suggest several implications in two perspectives: institutional practice, future research. On the perspective of institutional practice, we have four suggestions. First, it is important to understand that the quality of ICT-related support within traditional universities is hard to be accomplished without systematic effort of related departments. So, university should try to establish the physical factors like facilities and organizations to use e-learning, and mental and procedural factors like self-evaluation system. Second, they should understand the purpose of using ICT-related support in traditional universities is quality improvement of

whole education and set up the quality standards or indicators of ICT-related support when they use blended learning. For this, they can use the indicators of this study to measure the state of universities. Third, universities need to systemize the whole process of ICT-related support all-related tasks from registration to checking the grade/accreditation. Forth, it is necessary to establish an a body (department or center) wholly responsible for ICT-related support and tasks in the university. This body takes roles of driving, unifying and improving ICT-related services continually.

Next, on the purpose of future research this study suggests two implications. First, the indicators need to be used and validated. These indicators are originally established to measure the conditions of university and to find out what is deficient to promote ICT-related support and improve the total quality of education in traditional university. So usability and validity of these indicators need to be inspected. Second, importance score may be different on the situation of universities, importance score or weights of indicators should be re-examined in various condition and time of point. And quality indicators of ICT-related support need to be revised annually and should reflect the demand of universities and situation. Third, research on the quality indicators of blended learning needs to be done. Final purpose of introducing informational technology into traditional universities is to improve the quality of education.

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