Study on the effectiveness of corporate education service with comparison between offline and online education service using SERVQUAL model

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Abstract

In this research, we empirically evaluate the difference between off-line and on-line corporate education services in terms of their service quality levels. Especially, in order to judge the efficiency and effectiveness of the increasingly popular on-line educational service and to provide a deeper understanding on how to improve it, we adopted three dimensions of the well-known service quality measurement, SERVQUAL model, and the other web service-related variables, Convenience, Information symmetry, and Reciprocity. Survey data was collected in a major public corporation and analyzed to see the homogeneity of the statistical relationship of the proposed determinants to the effectiveness of learning and their magnitudes between two services.

Findings show that the five dimensions are equally important for both services. Those are Tangible, Reliability, Convenience, Information symmetry, and Reciprocity dimensions. Responsiveness dimension turns out to be an important factor only for on-line educational service. Hypothesis testing reveals that the statistical association between those five variables and a dependent variable, Learning effectiveness, are all identically significant except that the Convenience dimension was not an important determinant for a better Learning effectiveness. However, the sample perceived the off-line educational service as more effective in learning than the on-line educational service. Comparing the average scores of the independent variables between two services, the off-line educational service is the better in all for service quality dimensions except the Convenience dimension than the on-line service.

We conclude that for the on-line educational service as well as off-line, the quality of the education depends on the traditionally recognized components for a good education service, such as the mutual rapport between teachers and students, the perfect understanding of contexts, reciprocal interaction, the tangibly handy learning materials and the quality of the teaching tools. In other words, in order to make the on-line educational service more effective, the functional aspect like the Convenience dimension was not important not as much as expected, but the pedagogically important determinants of educational quality for off-line education are equally important for the on-line educational service. The finding indicates that above all, efficient Reciprocity and information symmetry are the two most important factors, suggesting the need to improve the way to communicate interactively between the lecturers and students, which have been regarded as critical limitation of on-line educational service.

1. Introduction

Human capital has been emphasized as a critical element to strengthen the competitive edge of companies. Intangible assets and the utilization of internal knowledge have been also judged by the degree of how much superior human resources is. Due to this importance of retaining the superiority of employee, many companies have endeavored to make various educational programs for development and improvement of employee's capability and knowledge. While companies' previous educational services were mainly composed of the off-line group education, we are nowadays able to offer “e-Learning” through on-line multimedia thanks to the introduction of the internet and the development of the various online educational platforms. Despite that the on-line's speed, Convenience and economy make more companies' educational systems move into on-line, the educational effectiveness of on-line education service has been questioned and not been empirically proved yet.

In this research, we empirically evaluate the difference between off-line and on-line corporate education services in terms of their service quality levels. Especially, in order to judge the efficiency and effectiveness of the increasingly popular on-line educational service and to provide a deeper understanding on how to improve it, we adopted three dimensions (Reliability, Responsiveness, tangibility) of the well-known service quality measurement, SERVQUAL model and the other web service-related variables, Convenience, information symmetry, and Reciprocity. Survey data was analyzed to see the homogeneity of the statistical relationship of the proposed determinants to the effectiveness of learning and their magnitudes between two services.

This study consists of four main sections. The following section summarizes the theoretical background of the study. Research model and methodology are then introduced along with the proposed research hypothesis. The conclusions and implications of the findings are presented at the last section.

2. Theoretical Background

2.1. On-line / Off-line Education Service and e-Learning

Because the term, “education service” is unfamiliar and not widely accepted in Korea yet, the definition of this term is neither clearly defined (Il-Woo, Baek, Yong-Suk, Hwang, 1998). While there are also lots of theories whether “education” is a service or not, some scholars who study Education Economics , Management, Economics, are including education as a range of service. Korea’s Standardized Industry Classification Index has also classified education as a service and education is also included in the GATT's service classification. So, education service can be a kind of representative public service like a administration service.

The new type of educational services, distance learning, has been evolved from simple long distance learning through TV to a specific, unique, teaching environment via Web. This new educational arena requires not only special curriculum structure and the unique administrational harmony, but also a new way of special instructional techniques and particular communication by electronics and other engineering (Moore and Kearsley, 1998). It is now known as a “e-Learning” which is rapidly spread out and used in various educational environment along with the advent of new communication technology such as Internet, satellite, cable, network and multi-media.

Along with the advent of knowledge-based society in 21 century with speedy spread of using internet, e-Learning has showed up as a new paradigm which can offer the educational and learning materials any-time, any-where, any-body in an efficient manner. This phenomenon is drastically changing the educational environment in which has been lagged behind in utilizing information technology.

Law of Industry Development in Korea defined e-Learning as a study that use and apply with electronic methods, communication technology, technique of multimedia and broadcasting. It includes not only online study which has been classified as an e-Learning but also computer-based study and remote-education which are based on the broadcasting and communication media. And e-Learning contents are defined as information or data that treated in signal, letter, diagram, color, sound, voice, image, picture by electronic methods. (Kyung-Hee, Kwan, 2004)

The most primitive aspect of e-Learning is a CBT (Computer Based Technology), which uses computer as supplementary learning material. Following the CBT, CBI (Computer Based Instruction) was introduced to use the pre-defined instructional steps in computer independently without instructors. Gradually, CBI evolves WBI (Web Based Instruction) when WWW becomes a common application platform. WBI provides abundant study resources and convinces but still has a lot of constraints to replace the traditional off-line educational activities.

E-Learning that one-step evolved than WBI acted a role of center as a transmission. It was based on the system and focused on how deal successfully with constraints of time and space. And it also focused on the way of how transmit the education resources cost-effectively and there is no consideration about an agony of learner. A learner's educational level or style is ignored. It transmits education environment which is uniformly made by system and instructor to all learners one-sided and it become a e-Training that uniformed and offers repeated training. As 2002 began, changes appear on e-Learning gradually.

It has been easy to meet the interoperability and reusability by using the environment of the object-oriented learning programming as a representation of the SCORM(Sharable Object Reference Model), and also can be possible of sequencing in the first step by combining with LMS(Learning Management System). Although we have interoperability and reusability in the phase of the explicit object-oriented learning programming, because there are no adaptability of the teaching and learning perspectives, we might be faced the good-for-nothing concerns. Because of this reason, we are needed to have the brand-new and visionary model of e-learning. There are some problems generally pointed out. (Eui-Suk, Jung, 2005) Firstly, it is the lack of ability of the teaching planning. Instructors have to use the teaching materials properly to be fit into the goals of their teaching, but they don't have that ability for the teaching planning. Secondly, it is the lack of the ability to make full use of the interactive medium. It is needed to have a high degree of the intelligence and skills to make perfect teaching by internet. Lastly, it is the lack of the intelligence and skills in the given condition. It is needed to have some skills and human resources to regulate and control the internet systems, to make the internet useful, to manage the facilities and to upgrade software and hardware. If we are in this situation, there wouldn't have any further development of the superior teaching courses. Also we need to have the application of the systematic approaches.(Chang-Min, Kim, 2005)

In some researches of the learning effect in e-learning, Lee Jung-sun said, we can expect the high satisfaction when we think of the motivation of usefulness important. And especially in this research, there are the highest interconnections between the autonomy and satisfaction in learning, so those who regard autonomy in learning as an important factor can have the high degree of satisfaction more easily. The most important features of the internet media are the interaction combined with the function of the medium. Generally speaking, it is the interaction that the mixed concept of the interaction, swift reaction, customer's controls and feedback is. It means the relationship between users and operators, and it is a very important concept made up of not the part of the contextual part but the factors of the mediums. (Ki-Moon, Kang, 2005)

Heeter(1989) has appointed the interaction as an important factor to have great influence on using actions, users' action and satisfaction. He have emphasized that the

most important features in using of the multimedia is the interaction, categorizing it in the six dimensions. Those are the features such as the various choices of users, the degrees of the system reaction by users, the continuous monitoring, the degree of the adding information and the activation of the personal communication. (Sae-Kyung, Yu , Yoon-Sin, Byun, 2003)

It is driven out that the stability in the management, the possibility of the user's approach, the easiness of the management of the course in the antecedent researches concerned with the effect in the e-learning of the education system are. And in the phase of the interaction, we have driven out the diversity of communication, the application of the communication instrument and the easiness of the accessibility as critical factors. In the assessment, we have driven out some critical factors such as the easiness in the management of assessment, the diversity in the cases of assessment and reusability in the problems in assessment. And in the offering information, we have driven out some critical factors such as Convenience in supplying information, the degree of retrieving information and the accessibility of information. In the e-learning, in addition to the features such as the elements of the designing a screen, we have driven out the clarity of the content of appointment, consistency and unity of the screen, adequacy of the controlling users and the using mediums, readability of the contents and the Convenience of the navigation. And in the requests of the organizations, we have driven out suitability of demands in learning, economical reasonability and the supports of users. (Sung-Wan, Kim, 2002)

2.2. Studies on Service Quality

(1) Concepts of Service Quality

The efforts to raise competitiveness in the service industry and to improve a service quality have been recently received interests in our society. Quality revolution on service sectors is considered as one to determine the success or failure of firms as it has affected significantly the competitive power of firms on manufacturing sectors (Overveit, 1992). That is because quality services can be a distinctive and effective strategy for securing customers and for acquiring Reliability among severe competition between corporations, consequently they will allow corporations to be successful among any others. Besides, now it is the era of quality management in which service quality improved trough an overall industry, beyond simple growth of manufacturing or quantity, raises competitiveness of firms to stand continually on a dominant position.

In general, the service quality has been considered in areas of goods. And the concept of service quality shows discrepancy between researchers, or according to application purposes or viewpoints under a situation there has been no general concept of it. It is actually difficult to define clearly the concept of service quality owing to various aspects of them, such as characteristics of service quality, uncertain expectations of customers toward it, complexity of assessment criteria and satisfactions being out of proportion to facilities supplied.

Gavin (1987) summarized the service quality, considering the discrepancy, through five approaching methods, namely, transcendental, products-centered, user-centered, manufacturing-centered and value-centered approaches, and in them, user-centered approaching is the method being mainly used for service quality. This study presents other definitions on service quality as following.

Crosby (1979) told it as conformance to specifications of goods, Gronroos (1982) as what is related to expectations about what is supplied and how it is supplied, Parasuraman, Zeithaml, & Berry (1985), who made great contributions to researches on service quality, as an overall decision or attitude concerning service dominance, and Cronin and Taylor (1992) as an attitude meaning a longitude and overall assessment for specific service.

(2) Determinants of Service Quality

Increased interests in service quality have brought a lot of studies on determinants of it, and the service quality is thought to be classified into an actual quality and a perceived quality of service. Much consideration is put on the perceived service quality, which is customers' assessment and judgment to service quality. Swan & Combs (1979) divided service quality into instrumental performance and expressive performance, and Lehtinen (1985) into physical quality, corporate quality, and interactive quality. Physical quality means a physical aspect of service, corporate quality is an image and profile of a corporate and interactive quality is quality drawn by interactions between employees and customers.

Gronroos (1982) argued that service quality was determined by two factors, expected service on what is supplied and how it is supplied and the perceived one. And he thought that what is significant to determine service quality is physical and technological aspects, workers giving services to customers and other participating customers, and they have effects on the perceived service quality of customers. In him, the perceived serviced quality is an overall attitude or judgment of customers toward services provided.

Overtveit (1992) said service quality was composed of client, professional and management qualities, and Karmarkar (1993) argued that the entire service quality, a collective term for goods quality and process quality of service, was made with conformance quality which was determined by customers' expectations and service specifications, communications quality which was determined by customers' preferences and service, goods quality to be determined by customers' preferences and service supplied, expected quality to be settled by customers' preferences and their expectations, and residual quality to be determined by service provided and customers' expectations, and three main factors for measuring service quality were performance, conformance and communication qualities.

The following shows various theories on service quality determinants by researchers.

Table 1 Previous studies on Service Quality

Researcher	Classification	Description
Lehtinen (1985)	Physical quality	Qualities of facilities and equipment
	Corporate quality	Qualities of corporate images and impressions
	Interactive quality	Qualities to occur between interactions of employees and customers, and customers
Gronroos (1982)	Technical quality	On technical calculations of the producing process of service (Objective)
	Functional quality	On interactions between customers and employees (Subjective)
Overtveit (1992)	Client quality	On how customers recognize services
	Professional quality	On service providers
	Management quality	On designs for satisfying customers' desires
Swan & Combs (1979)	Instrumental performance	On a technical aspect
	Expressive performance	On a psychological aspect
Karmarkar (1993)	Performance quality	Quality determined by customers' preferences and service specifications
	Conformance quality	Quality determined by service supplied and its specifications
	Communications quality	Quality determined by customers' expectations and service specifications
	Actual quality	Quality settled by customers' preferences and service provided
	Expected quality	Quality settled by customers' preferences and their expectations
	Residual quality	Quality settled by service provided and customers' expectations

In such studies on quality, quality assessment by PZB (Parasuraman, Zeithaml, and Berry) has made a strong development recently. They set up ten standards of service quality evaluated by customers and later synthesized those standards to five aspects (Tangibility, Reliability, Responsiveness, Assurance and Empathy) to complete the SERVQUAL model (see Table 2). It is significant fact that this is an expectation-performance model and the perceived service quality by customers are differences between customers' expectations for service and performances resulted from actual service. That has been a criterion for lots of service quality verification and recognized as a most fundamental standard of service quality until now even though there have been also varied modifications and criticisms for it. Through this measure, studies on criteria for quality assessment per service field or its kind are being carried out by many researchers (Mun-ho Lee, 2000).

Table 2 Five aspects of Service Quality

Aspect	Description
Tangibility	• The appearance of physical facilities, equipment and personnel
Reliability	• The ability to perform the promised service dependably and accurately
Responsiveness	• The willingness to help customers and to provide prompt service
Assurance	• The knowledge, courtesy and belief of employees and their ability to convey trust and confidence
Empathy	• The provision of caring by companies, individualized attention to customers

It is from the early 1990s for studies on service quality of information system applying the SERVQUAL, which is a measuring tool for marketing area, to be performed. Later Kettinger & Lee(1994, 1997), Kettinger, Lee & Lee(1995), Pitt et. al.(1995, 1997), Van Dyke et. al.(1997, 1999) and so forth led such researches.

Mainly through modifications and complements of the SERVQUAL model by PZB (1985, 1988, 1994), studies on service quality measurement for information system has been carried out(Kettinger & Lee, 1994; Lee & Lee, 1995; Pitt, Watson & Kavan, 1995; Kettinger & Lee, 1997).

As for domestic researches in respect to service quality in information system, Heung-seop Eom (1999), with a recognition that success of information system is determined by whether customers satisfy its service or not (Woodroof & Burg, 2003), understood the aspect of service of information system, and examined determinants of the service quality from the users' point, extracted aspects to determine the service quality by using determinants, and compared and observed how much those aspects affect users' satisfactions and differences according to characteristics of users, so as to present a strategic meaning on service quality management of proper information system. Myun-joong Cheon (1999), as a questioning research on service quality and effects of the out-sourcing of information system, conducted a survey, intended for 500 firms in Korea, and analyzed 78 firms outsourcing their works: as results, first, strategic and technical impacts are affected by Tangibility of service quality in the outsourcing of information system; second, economic impacts of the outsourcing are related to empathy of service quality. Consequently, the service quality by him was drawn into three aspects of Reliability /Responsiveness, Tangibility and empathy from five of them in the SERVQUAL.

You-jae Yi and Jun-youb Lee (2000) suggested the modification of the SERVQUAL based on the fact firstly, the SERVQUAL focuses on only a procedural feature for service quality (so they added a variable of performance to the model) and secondly, the model, in estimating service quality, does not show identical results on all of areas in the service industry, so the differences according to categories of business should be reflected. From their point of view, a standard of service quality for information system by Kettinger & Lee(1994,1997), Kettinger, Lee & Lee(1995), Pitt, Watson & Kavan(1995) and others, and a preceding research on the service quality of hotels' information system, intended for the hotel business, (Cho & Wong, 1998; Heo, 2001) have a significant meaning.

Table 3 Studies on Information System Quality

Researcher	Scope of Research	Constitution
Kettinger and Lee(1994)	Analysis of relationships between SERVQUAL and USISF: Internal information service of 342 graduate students, Likert scale of 7 points	Tangibility, Reliability, Responsiveness, assurance, empathy
Kettinger, Lee and Lee(1995)	Information system of America, the Netherlands, Korea, Hong Kong; Comparative analysis of service quality per nation	America • the Netherlands (4) Korea (3), Hong Kong (4)
Kettinger and Lee(1997)	Argued for an availability of SERVQUAL, supplying managemental suggestions, for continual measurement, despite the superiority of SERPERF than SERVQUAL	Reliability, Responsiveness, assurance, empathy
Pitt, Watson and Kavan (1995)	Overall information system; measurement of effectiveness of IS depts. with 181 people of financial businesses, 181 of consulting companies, 267 of information system services, Expanded service quality into the IS area.	Tangibility, Reliability, Responsiveness, assurance, empathy Financial business (7), Consulting firms (5) Information service firms(3)
Grover, et al.(1996)	Information system; service quality of outsourcing and effects of partnership, 1,000 CEOs of information system computer businesses	Tangibility, Reliability
Van Dyke Kappelman and Prybutok (1997)	Argued for necessities of a measuring tool of IS-SERVQUAL	Tangibility, Reliability, Responsiveness, assurance, empathy
Cho and wong (1998)	Hotel business of Hong Kong; 36 middle managers, F& B Cost management system	Data/Information, HW/SW environment, operation procedure, technological support, security
Watson, Pitt, and Kavan (1998)	Longitudinal studies for administration consulting (1992, 1993, 1995) and information service businesses (1993, 1994, 1995), Measuring tool of SERVQUAL	Tangibility, Reliability, Responsiveness, assurance, empathy
Van Dyke, Prybutok and Kappelman (1999)	Overall information system; providers of information service of 112 organizations of 33 businesses (ISP) 138 External information service, Likert scale of 5 points Argued against the modified measuring tool, IS-SERVQUAL of Kettinger and Lee(1994)	Reliability, Responsiveness, assurance, empathy
Heung-seop Eom (1999)	Common corporations in Busan•Gyeongnam region; Questionnaire of 255 copies for 255 users of information system of information • communications business, Cluster Sampling	Output information, support, service attitude, supplied facilities•equipment, operation of facilities and equipment, application information
Myun-joong Cheon (1999)	78 firms having outsourcing works; Nominal scale, Likert scale of 7 points	Reliability/Responsiveness, Tangibility, empathy
Jiang, et al. (2000)	American companies; 200 users of information system Applied the measuring tool SERVQUAL	Reliability, Responsiveness, assurance, empathy
Myeong-bok Jang (2001)	300 manufacturing firms with above 10 full-time workers; 210 users of information system	Supporting departments and personnel
Jung-bong Huh (2001)	Hotel information system of 7 hotels; 575 employees of hotel businesses A model of Pitt, Watson and Kavan (1995)	Tangibility, Reliability, Responsiveness, assurance, empathy, suitability
Kang and Bradley (2002)	IT depts. of Australian universities; 13 questions excepting Tangibility of SERVQUL of Three-column-format	Human technologies, IT service

3. Research Design

3.1. Research Model and Hypotheses

This study is to evaluate the Learning effectiveness of educational service in terms of service quality. In order to compare the effectiveness of education services between on-line and off-line education service, the SERVQUAL model suggested by Parasuraman, Zeithaml, and Berry is used as a main theoretical basis, seeking for the future improvement of on-line educational service in a corporate training environment. Tangibility, Reliability and Responsiveness variables were selected among determinants of service quality in the SERVQUAL model. In addition, considering the unique characteristics of online education service researched in the previous studies, Convenience, Information asymmetry, Reciprocity variables, were added into the research model. As for a dependent variable, Learning effectiveness variable was selected. Table 4 shows definition for each variable and measurement items. Research hypotheses and models were posed, based on the literature review and the theoretical basis in the previous sections. (see Figure 1)

Hypothesis 1. High Tangibility positively affects Learning effectiveness.
Hypothesis 2. High Reliability positively affects Learning effectiveness.
Hypothesis 3. High Responsiveness positively affects Learning effectiveness.
Hypothesis 4. High Convenience positively affects Learning effectiveness.
Hypothesis 5. High Information asymmetry positively affects Learning effectiveness.
Hypothesis 6. High Reciprocity positively affects Learning effectiveness.

Assuming that the magnitude and the statistical relationships between independent and dependent variables would show the significant difference between offline and online educational services, the identical set of hypothesis above has even applied to two different group of samples, the online vs. offline samples as follows. (See Figure 1)

Fig. 1 Research Model

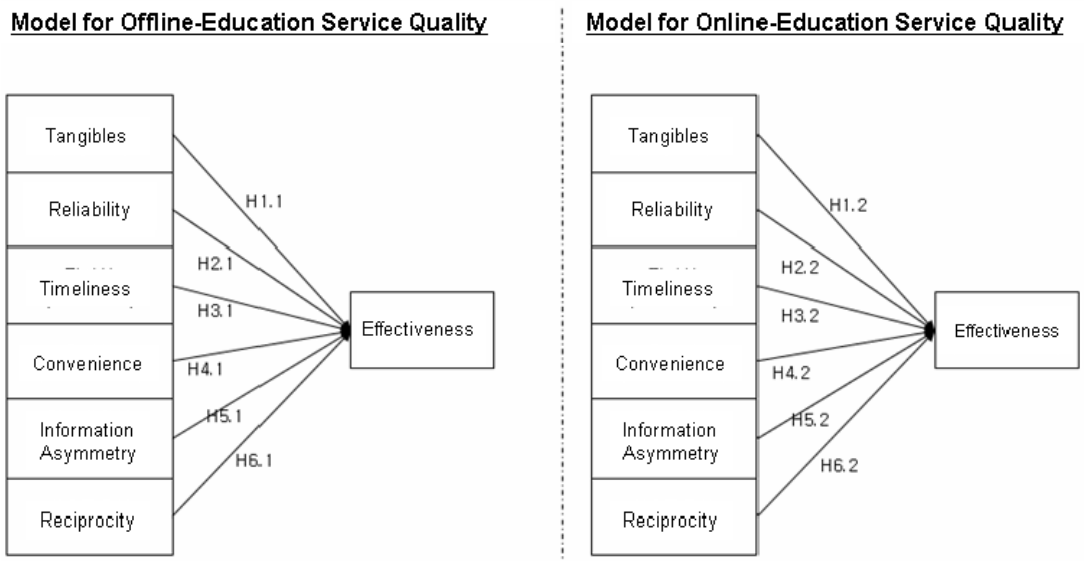

Table 4 Operational Definitions of Research Variables

Determinants of Education Service Quality	Controlled Definition
	Questions
Tangibility	Tangible evidence input into provision of service
	Lecture rooms, teaching aids, appearances of lecturers, lecture platforms, hardware including PC, design of websites
Reliability	The degree of trust in consistency and accuracy of service to be carried out, and ability and integrity of learning contents
	The degree of trust in level of programs, conformance to class progresses, reputation of lecturers and adherence to class time
Responsiveness	The ability to make prompt measures to learners' demands and capacity
	Returning time of questions, lecturer's degree of understanding to learners
Convenience	The level of learners' benefit in time and space for education programs
	Location of facilities, time for movement, variety of programs, possibility to select programs and education time
Information asymmetry	The level of learners' understanding to education contents of lecturers
	Understandability, scores, achievement degree for education goals, learner's ability to convey education contents
Reciprocity	The degree of mutual communications between lecturers and learners, and learners
	Level of participation by learners and interchanges of learners, possibility to make questions, group activities, level of sympathy, immersion
Learning Effectiveness	The degree of learners to utilize contents of education in works and outside the works
	The level of impacts on improvement of problem-solution ability and work performance, self-development, high capability of human resources

3.2. Measurement and Analysis

The data of this study was collected for 31 days in the fourth quarter of 2006. Questionnaire of 224 copies was returned, from the sample frame of 405 workers of H companies, and the final analysis was conducted on 192 copies excluding 32 copies of problematic responses. The response ratio was 47%. Measurements were made out with the Likert scale of 7 points. SPSS 11.5 version was applied for all the analyses such as frequency analysis, correlation, factor analysis and multiple regression analyses.

4. Research Results

4.1. Frequency Analysis

Total 192 subjects were made of 152 males (79.2%) and 40 females (20.8%); Age ranges from 4 people in teens (2.1%), 28 in twenties (14.6%), 136 in thirties (70.8%) to 24 in forties (12.5%). And respondents have a relatively higher educational background: 8 high-school graduates (4.2%), 132 university graduates (68.8%), 16 students attending graduate schools (8.3%) and 36 above graduation of graduate schools (18.8%).

Table 5 Sample Profile

Variable		Frequency	Percentage
Gender	Male	152	79.2%
	Female	40	20.8%
	Total	192	100.0%
Age	10s	4	2.1%
	20s	28	14.6%
	30s	136	70.8%
	40s	24	12.5%
	Total	192	100.0%
Education	High-school graduation	8	4.2%
	University graduation	132	68.8%
	Attending graduate schools	16	8.3%
	Above graduation of graduate schools	36	18.8%
	Total	192	100.0%
Position	Staffs	24	12.5%
	Deputy managers	80	41.7%
	Managers of sections	52	27.1%
	Vice-chiefs of departments	32	16.7%
	Managers of departments	4	2.1%
	Total	192	100.0%
Years of continuous working	1 ~ 5 years	56	29.1%
	6 ~ 10 years	88	45.9%
	Above 11 years	48	25%
	Total	192	100.0%

Respondents are composed of 24 staffs (12.5%), 80 deputy managers (41.7%), 52 managers of sections (27.1%), 32 vice-chiefs of departments (16.7%), 4 managers of departments (2.1%), and the number of years of continuous working is 1-5 of 56 workers (29.1%), 6-10 of 88 workers (45.9%) and above 11 of 48 workers (25%), so 6-10 working years was the majority of the sample, showing the relatively long job experience.

Table 6 Distribution Table of Education Frequency for a Year

Variable (No. of education performed for one year)		Frequency	Percentage
Offline	1 ~ 4 times	176	91.6%
	5 ~ 9 times	4	2.1%
	10 ~ 14 times	4	2.1%
	Above 15 times	8	4.2%
	Total	192	100.0%
Online	1 ~ 4 times	172	89.5%
	5 ~ 9 times	8	4.2%
	10 ~ 14 times	8	4.2%
	Above 15 times	4	2.1%
	Total	192	100.0%

The number of education carried out for one year was measured for offline and online educations: as a result, for off-line education, 1-4 times of 91.6%, 5-9 times of 2.1%,

10-14 times of 2.1% and above 15 times of 4.2%; for on-line education, 1-4 times of 89.5%, 5-9 times of 4.2%, 10-14 times of 4.2% and above 15 times of 2.1%. It shows that both off-line and on-line education cases are offered one to four times per year in most of employees.

4.2. Analysis on Validity and Reliability of the Measurements

Explanatory factor analysis was implemented to test the structural feasibility of the research measurement. The factor analysis joins similar variables together, so variables should have at least one of high correlation between them. Principal component analysis (PCA) was utilized for extracting factors and Varimax rotation was applied to keep mutual independence between factors and to make factor interpretation more clear.

Factor analysis on six Independent variables and one dependent variable for 28 questions of off-line educational service is shown in Table 7. Appling the extraction rule of the factors having a factor loading at 0.5 or above and at least 3 items per each factor, six independent variables, Tangibility, Reliability, Convenience, Information asymmetry and Reciprocity and one dependent variable, Learning effectiveness were loaded but Responsiveness factor was excluded because of single item loading.

Table 7 Factor Analysis (Off-line educational service)

Item	Component						
	Tang-ibles	Reliabil-ity	Respon-siveness	Conven-ience	Information asymmetry	Reciprocity	Learning Effectiveness
OFFTANG1	.754						
OFFTANG2	.841						
OFFTANG3	.662						
OFFRELI1							
OFFRELI2		.562					
OFFRELI3		.876					
OFFRELI4		.603					
OFFTIME1							
OFFTIME2							
OFFTIME3			.509				
OFFCONV1				.600			
OFFCONV2				.664			
OFFCONV3				.856			
OFFCONV4							
OFFINFO1					.503		
OFFINFO2					.654		
OFFINFO3					.571		
OFFINFO4					.572		
OFFRECI1						.768	
OFFRECI2						.870	
OFFRECI3						.681	
OFFRECI4						.796	
OFFRECI5						.787	
OFFRECI6						.717	
OFFEFFE1							.628
OFFEFFE2							.678
OFFEFFE3							.765
OFFEFFE4							.884

Extraction Method: Principal Component Analysis. Rotation Method : Varimax with Kaiser Normalization. Rotation converged in 11 iterations

Table 8 shows the results of factor analyses on 6 independent variables and 1 dependent variable for on-line educational service. The same extraction rule of factor analysis for off-line sample was applied. As results, six independent variables, Tangibility, Reliability, Responsiveness, Convenience, Information asymmetry and Reciprocity and one dependent variable, Rearning effectiveness, were loaded successfully.

Table 8 Factor Analysis (On-line educational service)

Item	Component						
	Tang-bles	Reli-ability	Respon-siveness	Conven-ience	Information asymmetry	Reciprocity	Learning Effectiveness
ONTANG1	.764						
ONTANG2	.843						
ONTANG3	.810						
ONRELI1		.590					
ONRELI2		.850					
ONRELI3		.583					
ONRELI4							
ONTIME1			.509				
ONTIME2			.540				
ONTIME3			.859				
ONCONV1							
ONCONV2				.757			
ONCONV3				.831			
ONCONV4				.750			
ONINFO1					.724		
ONINFO2					.837		
ONINFO3					.736		
ONINFO4							
ONRECI1						.538	
ONRECI2						.763	
ONRECI3						.869	
ONRECI4						.878	
ONRECI5						.932	
ONRECI6						.600	
ONEFFE1							.662
ONEFFE2							.727
ONEFFE3							.862
ONEFFE4							.893

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 9 iterations.

And a set of reliability analysis was implemented, by calculating Cronbach Alpha for each variable. Table 9 exhibits findings of the analysis that demonstrate the high reliabilities of all the variables.

Table 9 Reliability Analysis (Independent and Dependent Variables)

Factor		No. of Data	No. of Items	Cronbach's Alpha
Independent Variable (Off-line)	Tangibility	192	3	0.9387
	Reliability	192	3	0.8081
	Convenience	192	3	0.8844
	Information asymmetry	192	4	0.7329
	Reciprocity	192	6	0.6786
Dependent Variable	Learning effectiveness		4	0.9176
Independent Variable (On-line)	Tangibles	192	3	0.9541
	Reliability	192	3	0.8473
	Responsiveness	192	3	0.8323
	Convenience	192	3	0.8261
	Information asymmetry	192	3	0.8886
	Reciprocity	192	6	0.9143
Independent Variable (Off-line)	Learning effectiveness		4	0.9246

4.3. Findings of Hypothesis Tests

To analyze relationships posed in the six hypotheses, the multiple regression analysis were implemented for five independent variables and one dependent variable for off-line educational service, and for six independent variables and one dependent variable for on-line educational service. Results of multiple regressions for off-line educational service are as follows. The effects of Tangibility, Reliability, Convenience, Information asymmetry and Reciprocity variables on Learning effectiveness were tested through a linear regression analysis.

When the robustness of a linear regression model was examined, the overall explained variance of the model is 69.9% (R^2 = 0.699) and the standard error of estimate is 0.65155 and F variation for the variation of R^2 is 68.522. F variation of significance probability is 0.000, showing that statistic significance for the model.

Table 10 Variance Analysis (Off-line educational Service)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	117.851	5	23.570	55.522	.000(a)
	Residual	78.961	186	.425		
	Total	196.813	191			

Table 11 t-Test Results (Off-line educational Service)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	**(Constant)**	.329	.302		1.090	.277
	Tangibility	.163	.045	.080	1.504	.034
	Reliability	.174	.049	.112	2.089	.038
	Convenience	-.038	.065	.185	3.584	.000
	Information asymmetry	-.045	.070	.297	3.916	.000
	Reciprocity	.359	.060	.351	4.875	.000

Dependent variable: Learning effectiveness

At the significant level of 0.05, Reciprocity was the most influential determinant for Learning effectiveness, and Information asymmetry is the second, followed by Convenience, Reliability and tangibility, which all have significant t-scores. Hypotheses 1-1, 1-2, 1-4, 1-5 and 1-6 are supported for off-line educational service. Hypothesis 3 was not tested because Responsiveness factor was not loaded as a factor in the factor analysis.

Table 12 Results of Hypothesis test (Off-line educational Service)

	Hypothesis	Selection
Hypothesis 1-1	In off-line education, high Tangibility positively affects Learning effectiveness.	Supported
Hypothesis 1-2	In off-line education, high Reliability positively affects Learning effectiveness.	Supported
Hypothesis 1-4	In off-line education, high Convenience positively affects Learning effectiveness.	Supported
Hypothesis 1-5	In off-line education, high Information asymmetry positively affects Learning effectiveness.	Supported
Hypothesis 1-6	In off-line education, high Reciprocity positively affects Learning effectiveness.	Supported

In case of on-line education, the Responsiveness variable was included in the regression analysis since it was loaded as a factor in the factor analysis. Therefore, the effects of independent variables, Tangibility, Reliability, Responsiveness, Convenience and Information asymmetry and Reciprocity and the dependent variable, Learning effectiveness was set to be a linear regression model.

Examining the robustness of a model, R^2 is 0.415 and it is found that the overall explained variance is 41.5%, and the standard error of estimate is 0.72628, F variation for the variation of R^2 is 21.892. When considering the significance level 0.05, F variation of significance probability is 0.000, and it can be thought that there is statistic significance for the variation of R^2. F-test also shows the statistical significance.

Table 13 Variance Analysis (On-line educational service)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.286	6	11.548	21.892	.000(a)
	Residual	97.583	185	.527		
	Total	166.870	191			

Table 14 t-Test Results (On-line educational service)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.432	.360		3.322	.001
	Tangibility	.067	.150	.087	1.242	.046
	Reliability	.102	.174	.068	1.000	.039
	Responsiveness	.038	.064	.039	.590	.556
	Convenience	.045	.055	.053	.819	.414
	Information asymmetry	.274	.058	.388	6.154	.000
	Reciprocity	.291	.064	.403	5.951	.000

Dependent variable: Learning effectiveness

Findings of t-tests at the significance level of 0.05 shows that two independent variables, responsiveness and convenience were not to be statistically significant determinants for learning effectiveness. Reciprocity was the most important followed by Information asymmetry, Tangibility, and Reliability. Therefore, for the on-line educational service case hypotheses 2-1, 2-2, 2-5, and 2-6 are supported.
Table 15 summarizes the results of the regression analysis for on-line educational service.

Table 15 Results of Hypothesis Test (On-line educational service)

Hypothesis		Selection
Hypothesis 2-1	In on-line education, high Tangibility positively affects Learning effectiveness.	Supported
Hypothesis 2-2	In on-line education, high Reliability positively affects Learning effectiveness.	Supported
Hypothesis 2-3	In on-line education, high Reliability positively affects Learning effectiveness.	Rejected
Hypothesis 2-4	In on-line education, high Convenience positively affects Learning effectiveness.	Rejected
Hypothesis 2-5	In on-line education, high Convenience positively affects Learning effectiveness.	Supported
Hypothesis 2-6	In on-line education, high Reciprocity positively affects positively Learning effectiveness.	Supported

In addition to the regression analysis, a series of paired sample t-tests were used to see the simple average difference of all the research variables. Findings show that scores for all variables between two services are significantly different. Especially the off-line education service is recognized to be superior to on-line service in all variables, except for Convenience.(See the table16)

Table 16 Comparison of research variables between off-line and on-line education services

Variable (On-line/Off-line)		Mean Value	t-score	Significance Probability
Tangibility	On-line	4.7431	-5.647	.00
	Off-line	5.1771		
Reliability	On-line	3.9028	-7.509	.00
	Off-line	4.5208		
Convenience	On-line	4.4444	12.073	.00
	Off-line	3.1042		
Information asymmetry	On-line	3.9792	-8.635	.00
	Off-line	4.7708		
Reciprocity	On-line	2.4618	-19.833	.00
	Off-line	5.0208		
Learning effectiveness	On-line	3.8490	-10.691	.00
	Off-line	4.7813		

5. Conclusion

Findings of regression tests and paired sample t-tests were summarized in table 17, where the priority shows the relative importance to the variance of the Learning effectiveness and the mean values of all the independent variables for both on-line and off-line educational services.

Table 17 Comparison of Research Variables between Off-line and On-line Educations Service

Priority	Off-line Education	Mean Value	On-Line Education	Mean Value
1	Reciprocity	5.021	Reciprocity	2.462
2	Information asymmetry	4.771	Information asymmetry	3.979
3	Convenience	3.104	Convenience (Rejected)	4.444
4	Reliability	4.521	Tangibility	4.743
5	Tangibility	5.177	Reliability	3.903

First of all, in the case of the Learning effectiveness, off-line educational service has significantly higher mean values than on-line. It means that the off-line educational service results in the better improvement of the problem-solving ability, the better job productivity, and the superior self-development than those of on-line education experience.

While the mean value of the Convenience variable for on-line case is higher than that of off-line, all the other independent variables have higher scores for off-line educational service. That is, the off-line educational service is superior to on-line in terms of the trustworthiness toward instructor accuracy and consistency in instructional materials, flexible class design, the understanding of student's ability and efficiency of mutual communications.

In the case of on-line education, despite of the recent improvement on two-way communication functions on the web, the chronic limitation still exist in the active class participation of students and interactions between students and instructors. We also note that the Reciprocity was important to increase the Learning effectiveness for both on-line and off-line educational services. It implies that the better Reciprocity of off-line

education through face-to-face interaction would be a main reason for the better educational effects in off-line education service.

In the case of the information-symmetry, we are able to know that both on-line and off-line have significantly influence the Learning effectiveness while the off-line case shows the higher association to Learning effectiveness than the on-line education service. That is, on the degree of the understanding the teaching content is more effective in the off-line education.

Another interesting finding is that the Convenience variable affects the Learning effectiveness not for on-line but for off-line education service. It implies that the on-line education users take it for granted to perceive the ease of use through time/space saving in case of on-line service and do not think it is a critical factor to gain a better Learning effectiveness. Off-line education service, on the other hand, would gain a better Learning effectiveness when the Convenience in the training location and flexible time schedule are provided. Between the on-line and off-line education service, the Reliability and the Tangibility dimensions are important for a high effectiveness of education. But, for the on-line education case, the tangible dimension is more important than the Reliability. It may indicate that the site design such as GUI or lay out or menu design for on-line education becomes important to provide an effective visual presentation and an efficient maneuver of the class materials.

5.1. Implications

In this study, we found the off-line education is recognized to be a better education service than the on-line. It would be because of the familiarity with the off-line education and the abundant chances of face-to-face interaction in the corporate off-line education. When we note the influential impacts on the Learning effectiveness, except for Convenience, the determinants of educational services for both on-line and off-line education are very identical in terms of their significances. So regardless of what the educational media are, the qualities of education relies on the very traditional basis for a good education such as the mutual responses between teachers and learners, the comprehension of the context, the mutual reliance, the tangible learning texts and the quality of the teaching mediums.

Many companies execute on-line and off-line education to develop the potential capacity of the executives and employees as a fundamental investment to create a better productivity and creativity. On-line education service become a hopeful option for a corporate education system because of lower cost, wider and easier access and Convenience. Our study indicates that these expected benefits may not be maximized when the design of on-line education only emphasize the unique strength of their media like Convenience. A corporate education planner may need to understand that the fundamental factors for an effective training stay the same regardless of the education media they choose. In addition, its chronic weakness, the lack of efficient mutual communication on the on-line education service, should be improved to be an effective, viable educational option in a corporation environment.

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