Validating Constructs of Web Usage in Education and Learning

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ABSTRACT

E-learning has become an ever-increasing delivery method in school and workplace. Many Web sites provide Internet users with lots of information and resources on study, research, and career development in workplace. First, this study aimed at presenting a process of validating instruments to measure perception of using the Web for learning. Secondly, this paper attempted to find out a list of critical constructs that university students recognize when they access Web sites to get some resources on their fields of study. This study also suggested the features of those constructs. This paper would help improve our understanding of Web usage for schoolwork and research. This result of the paper will facilitate further understanding of constructs associated with Web usage in other areas, thereby enabling researchers, practitioners, and policy makers to draw much attention to e-learning.

Key Words : Web usage, Construct, Instrument, Validation, e-learning

웹 사용자 인지측정 도구의 타당화 과정

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요 약

이-러닝은 학교와 직장에서 지식전달 수단으로 각광을 받고 있다. 많은 웹사이트는 인터넷이용자에게 학습, 연구, 경력개발과 관련된 많은 정보를 제공하고 있다. 첫째, 이 연구는 학습과 관련된 웹 사용에 따른 이용자의 인식을 측정하는 도구의 타당화 과정을 보이는데 목적이 있다. 둘째, 이 논문은 대학생들이 자신의 분야와 관련된 학습자료를 얻기 위해 웹 사이트를 이용할 때 그들이 중요한 요인으로 인식하는 주요개념을 확인하고 있다. 이 연구는 다른 분야에서의 웹 이용의 인지와 관련된 주요개념을 확인하는데 도움을 줄 것이다

키워드 : 웹사용, 구조, 도구, 타당성, 이러닝

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1. Introduction

According to Internet World Stats[26], the global Internet population reached 1.966 billion, 28.7 percent of world population, as of June 30th, 2010, which is up from 360.9 million on 20008. It has increased by an average annual growth rate of 44.48 percent from 2000. Internet World Stats[26] reported that 470.9 million people, or 50.3 percent of the total population, are now online in North America, up 271.3 percent at the end of 2000. eMarketer[25] unveiled that the number of Internet users in US will increase by a compound annual growth rate of 7.69 percent between now and 2013, reaching 210.9 million in 2011, and 216.0 million in 2012. According to a new report from the Department of Commerce, there were an average of 0.5 million new Internet users in the US every month in 2009. Furthermore, the number of rural households getting Net access for the first time is increasing at a faster rate than the number of urban households.

Koreans continue to expand their use of computers and the Internet. According to NIDAK[24], 36.58 million South Korean, 77.2 percent of South Korea's population of 47.383 million people age 3 and over, have access to the Internet as of Sep. 2009. This compares with 35.59 million people at the end of 2007 and 33.88 million at the end of 2005.

As the number of Internet user increases, the use of the Web for academic research and schoolwork purposes has especially grown tremendously over the past years. It may seem obvious that over recent years the introduction of the wireless Internet on smart phones and much smaller Internet devices such iPad and net book computer has had a significant impact on the way that academics work. Many Web practitioners are now actively engaging in the Web design and development of academic contents, and this trend is expected intensify in the future.

Nine in ten schools in the European Union now have Internet access, and pupils have access in eight in 10 of those, according to the European Commission. The European Commission said the provision of the Internet in schools is a priority in all member States. Schools in most of the Member States use broadband technology.

According to the data from e-Learning magazine [22], about 90 percent of the respondents in US described themselves as being supportive of or optimistic about e-learning. Also, they currently embraced e-learning or blended learning to a varying degree; over 80 percent of those surveyed responded that they were using e-learning or blended learning to train their employees. The respondents' organizations were making investments in e-learning, for instance, a majority of the respondents indicated that in 2003 their organization spent between one and 60 percent of their total training budget on e-learning. Moreover, 60 percent of those surveyed responded that their organization had a strategic plan for e-learning.

In South Korea, 52.5 percent of Internet users ages 12 and over access the Internet for education and learning. 81.1 percent of student respondents and 62.9 percent of worker respondents answered that the Internet is very important and important for their study, NIDAK[24] said.

There has been much research performed

on the level of usage, satisfaction, and effectiveness of the Web within organizations [3][5][10]. Web-based consumer services are generally perceived as being successful, but there has been little evaluation of how well the Web meets its users' primary information requirement [7].

Despite both computer and Internet use at school have increased substantially, there is a dearth of research identifying factors affecting education-related Web usage by students.

This study presents a process of validating instruments to measure perception of using the Web for learning. It could apply to other fields of research on validating instruments to measure human perception.

This study aimed to improve our understanding of education and learning Web usage for schoolwork and research. This study found out a list of factors that influence the usage of education-related Web sites by university students and suggested the features of those factors. This result will facilitate further understanding of factors associated with Education-related Web usage, thereby enabling researchers, practitioners, and policy makers to better design appropriate strategies to promote the Web usage. Furthermore the generalizability of previous results on factors associated with the Internet adoption and usage can be examined in the context of education-related Web.

2. Review of Prior Research

People may have decided to accept the Web usage for different reasons because the Web usage has occurred over time. For example, people that accept the Web usage may have recognized the usefulness sooner, and may have seen the Web as a way to gain their performance effectively and economically.

As a larger number of persons accept the Web usage, the Web usage becomes generalized, and rather than asking 'why use it', people begin to ask 'who is using it' and 'why am not I using it'. Later accepters may place less emphasis on perceived usefulness and easiness of the Web usage, and use the Web largely in order not to be left behind other persons at their work and school. Therefore, a time-based theory seems appropriate as one way to study the acceptance of the Web usage.

As people accept the Web usage at different times, people in each of the accepter categories are thought to differ in their perceptions of general attributes of the acceptance of new technology. Of those attributes, perceived usefulness [7][20], social pressure [4], ease- of-use, and control [11] have been found to significantly influence the acceptance of the Internet usage. This study was relied on prior research on the acceptance of the Internet usage in general to guide this work.

Researchers examining the Internet phenomenon have examined a wide range of issues such as demographics and growth [8][13], strategic and commercial uses [5], use in various functional areas [14][15], adoption and diffusion [3][10], and gender differences [19].

A few studies have investigated factors affecting the current usage of the Internet [2] [4][7][20]. Atkinson and Kydd[2] examined individual characteristics associated with Web use and suggested that both intrinsic factors

such as perceived ease-of -use and perceived enjoyment and extrinsic factor such as perceived usefulness affecting the Web usage differentially for enjoyment and for course work purpose.

Teo[20] extended Atkinson and Kydd's research by examining demographic such as gender, age, educational level and terms of four generic activities of messaging, browsing, downloading, and purchasing. Selim[16] researched on critical success factors for e-learning acceptance using confirmatory factors models.

Eight factors were identified as measures of the Web evaluation. These are Perceived Usefulness, Social Influence, Ease-of-Use, Ease-of-Control, Ease-of- Physical Access, Identity, Training, and Fun. The constructs that were selected were chosen because of their relative importance in previous research on the Internet usage, and articles that discuss the potential benefits of the Web usage.

2.1 Perceived Usefulness

Previous research has found that perceived usefulness has a strong and consistent relationship with the Web usage. For example, Teo[20] found that perceived usefulness was significantly correlated with the Internet usage activities. Similarly, Moon and Kim [11] found that perceived usefulness is important to user's perceptions of WWW system and there are the positive influences of perceived usefulness on attitude toward using the Web. A plausible reason is that individuals will access the Web only if they perceive that such usage will help them to achieve the desired task performance.

2.2 Social Influence

Some innovation adoption research provided evidence of external pressure of social; influence to use the Web [4][10]. The Web users may feel pressure to use the Web from other users typically from friends at school and work and potential competitors.

Social influence may be measured by identifying source from which potential users amy experienced pressure to use the Web. It is possible weighting beliefs according to the individual's motivation to comply with these pressures. Pressures to use the Web may come from peers, class at school, and the media[7].

2.3 Easiness

Easiness refers to the degree to which the user expects the use of the Web to be user friendly. Since effort is a finite resource that a person may allocate to various activities, it implies that all else being equal, an application perceived to be easier to use than another is more likely to be accepted by users [20]. Past research has generally confirmed that easiness can influence the Internet usage directly [4][20][11].

In general, if the Web is ease-of-use and ease-of-control, it requires less effort on the part of users, thereby increasing the likelihood of the Web usage. Conversely, the Web that is complex or difficult to use and control is less likely to be used since it requires significant effort and interest on the part of the user. In the context of the Internet, the easy to use browsers have largely been responsible for the rapid growth

in the number of the Web users. Teo[20] unveiled that ease of use is positively related to the Internet activities.

2.4 Identity Control

Some Web users are sensitive to identity control. D'Ambra and Rice[7] found out Identity control is a factor to influence on the Web usage. Users are likely to be reluctant to use the Web when the system administrator monitors their Web usage. And lots of users do not like to be put a trace on their Web usage behavior. Some Web users prefer visiting sites on the Web that do not require them to identify themselves and being anonymous on the Web.

2.5 Training

Aplebee et al.[1] found out that students felt they lacked training on how to use the Internet facilities. Training and knowledge on the Internet is an important factor affecting the Web usage at school. Some students need to develop their skill more to use search engines on the Web better, which means more training would make the Web use more effective. If users have greater computer of Internet knowledge, they would use the Web more and effectively.

2.6 Fun

Perceived fun may be defined as the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated [20]. Moon and Kim[11] unveiled that perception of playfulness appeared to influence user's attitude toward using WWW. Hence, individuals who experience immediate pleasure and joy from using the Web will be more likely to use it more extensively than others. By extending these results to the context of the Internet, we can therefore postulate that perceived fun would have a positive effect on usage activities.

3. Methodology

3.1 Procedures

This research questions were developed based on the Web related literature and the opinions of field managers knowledgeable in the Web usage. These questions are aimed at finding out the scope and domain of the factors that influence the Web usage and features of those factors.

This study followed a paradigm adapted from Betty et al.[3], as a framework for the study and subsequent analysis. As such this study was completed in two phases. The first phase consisted of expert interviews to help identify salient features concerning the Web usage and develop research instrumentation. The second phase was a survey of key participants in the Web usage for a number of university students.

The survey was used to collect the data. The questions were derived from other previous studies that have examined the same construct. Questions were modified to fit education-related Web context where appropriate.

Based on the resulting list of items, a set of statements of items was developed that

reflected the extent that the respondent agreed that an item influenced the Web usage. Questionnaire items formatted as a 5-point Likert Scale. The scale intensity ranged 1(strongly disagree), 2(disagree), 3(neutral), 4(agree), 5(strongly agree) indicating the extent to which the individual agreed that the item actually influenced the Web usage.

The respondents to this study were university students. A survey was conducted in November of 2009 by presenting it to a random sample of 186 students.

3.2 Construct Measures

The items used to measure Perceived Usefulness were adapted from Moon & Kim[11], Chang & Cheung[4] and Teo[20]. Respondents were asked to mark their agreement and disagreement with 6 statements.

Social Influence was also measured using a 5-point scale adapted from D'Ambra & Rice[7] and Chang & Cheung[4]. Respondents were asked to rate the items according to how much they were affected by their lecturer, friends, and media. The items are, "I use the Web because:" it is necessary for my classes, many of my friends in school do, my lecturer requires me to use it, and all the attention it receives in the media.

A new scale measuring easiness was modified based on prior researches of Chang & Cheung[4], D'Ambra & Rice[7], Moon & Kim[11], and Teo[20]. It was divided into three categories like Ease-of-Use, Ease-of-Control, and Ease-of-Physical Access in this paper.

Identity Control was captured by a three-item itemized rating scale. The conceptualization and operationalization of the construct was adapted from D'Ambra & Rice[7]. The items are about requirement of identity, anonymousness, and system administrator's monitoring.

A scale measuring Necessity of Training was developed in this study. It was measured by a three-item, 5-point Likert-type scale. Respondents were asked to mark their agreement and disagreement on relationship between skill and knowledge on the Internet and effectiveness of using the Web.

Perceived Fun and Concentration was measured by a seven-item itemized rating scale. Its operationalization was adapted by Moon & Kim[11], and D'Ambra & Rice[7]. The five items are, "Using the Web:" is fun, stimulates curiosity, leads to academic exploration, arouses imagination, and gives enjoyment. The others are, "While interacting with the Web:" not realizing the time elapsed and not being aware of any noise.

4. Explanatory Factor Analysis

Although the sets of items used to measure each of the constructs in this study were grounded in theory, they were derived from a variety of sources and some items were modified from their original scales to fit the Web usage context. Thus, their individual measurement properties, such as dimensionality and internal consistency, may have changed in our context. Dimensionality and internal consistency are two major aspects of construct validity. Because it is related to whether the constructs measure what the researcher believes them to measure, it is critical to examine properties

of the measures prior to further analysis [3].

Assessing dimensionality involves examining the inter-correlations among the measurement items. Those that are highly correlated are believed to measure the same construct, and those that are not are believed not to do so. A correlation matrix for the items is shown in <Table 1>.

<Table 1> Correlation Matrix for the Original

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.785	1.00													
3	.669	.629	1.00												
4	.236	.325	.435	1.00											
5	.176	.179	.253	.756	1.00										
6	.284	.426	.189	.538	.748	1.00									
7	.554	.648	.329	.367	.294	.425	1.00								
8	.463	.363	.647	.251	.375	.217	.538	1.00							
9	.103	.183	.523	.426	.473	.327	.648	.783	1.00						
10	.112	.275	.209	.364	.428	.219	.836	.509	.391	1.00					
11	.235	.311	.218	.269	.327	.253	.574	.340	.279	.219	1.00				
12	.112	.108	.312	.395	.419	.573	.327	.235	.316	.317	.295	1.00			
13	.346	.442	.193	.264	.329	.264	.035	.429	.316	.286	.306	.329	1.00		
14	.217	.386	.331	.362	.362	.259	.352	.261	.346	.319	.263	.205	.321	1.00	
15	.227	.272	.253	.336	.271	.393	.204	.326	.428	.261	.312	.105	.2.8	.681	1.00
m.	4.02	3.98	4.34	3.57	4.11	2.57	4.67	4.57	4.79	4.68	4.57	.306	2.03	4.03	3.98
s.d.	.57	.73	.67	.84	.95	.69	.64	.82	.47	.35	.73	.93	.41	.64	.48

- m: mean, s.d.: standard deviation
- Items 1-3 are PU1 - PU3 meant to measure perceived useful; Items 4 and 6 are SI1- SI3 meant to social influence; Items 7 and 8 are EU1 and EU2 meant to measure Ease-of-Use; Items 9 and 10 are EC1 and EC2 meant to measure Ease-of-Control; Items 11 is EP meant to measure Ease-of-Physical Access; Item 12 is IR meant to measure identity requirement; Item 13 is NT meant to measure necessity of training; Item 14 and 15 are FC1 and FC2 meant to measure fun and concentration.
- All items measured on a five-point scale where 1: strongly disagree and 5: strongly agree.

However, it is somewhat difficult to assess the dimensionality of these sets of measures from observing only the correlation matrix. In addition, because of the complexity and difficulty of measuring human perceptions of phenomenon of interest, there may be relationships among measurement items that are not obvious from examination of a correlation matrix alone [3]. Factor analysis is one powerful and indispensable method of construct validation.

Factor analysis is a powerful tool that helps us better access the properties of sets of measures not only by accessing the correlation among items, but by using the correlation matrix to derive factor loadings that represent the correlation between an item and the construct, it is thought to measure. Although factor analysis does not directly constitute a test of construct validity, it does offer a way of constructing an interrelated set of indicators meeting one of

the conditions for construct validity: dimensionality [3].

If one or more indicators measure more than one construct, then it is difficult to establish reliability, which is also a necessary component of construct validity. Many information systems researchers use exploratory factor analysis to assess dimensionality [21]

Therefore, An exploratory factor analysis was employed to identify independent factors that influence Internet usage. An explanatory factor analysis was conducted to identify the factors underlying the questionnaire items.

During factor analysis, factors with Eigenvalues of at least 1.0 were used to access the number of factors to extract because factors with Eigenvalues of at least 1.0 were considered acceptable[18]. In addition, scree plots were examined to determine the plausible number of factors resulting from the analysis. This plots is applicable when there is a clear last substantial difference between adjacent Eigenvalues [6].

Two criteria were used to evaluate the factor items: significance of item loadings and simplicity of factor structure. Dimensionality of each of the factors was accessed by examining factor loading. Items with factor loadings of at least 0.4 on factors with which they were hypothesized to load were considered adequate indicators of that factor. The second criteria caused the elimination of items loading on multiple factors.

Factor analysis was conducted without pre-specifying the number of factors. To achieve a simpler factor structure that can be meaningfully interpreted, an orthogonal rotation was performed in this study because oblique rotations are more complex and is not very clear-cut. And to get a factor structure resulted in each factor representing a distinct construct, the extraction method used in this analysis was Principal Component Analysis with VARIMAX rotation with Kaiser Normalization. VARIMAX rotation has a factor structure in which each variable loads highly on one and only one factor. That is, given variable should have a high loading on one factor and near zero loading on other factors [17].

15 items were hypothesized to measure eight constructs as shown in <Table 2>.

〈Table 2〉 Selection Criteria Constructs and Items

Constructs	Items	Labels
Perceived Usefulness	Avoiding Lecturers Finding Valuable Resources Enhancing Performance	PU1 PU2 PU3
Social Influence	Friends Lecturers Media	SI1 SI2 SI3
Ease-of-Use	Easy to Find Information Easy to Use	EU1 EU2
Ease-of-Control	Convenient Search Engine Knowledge on Internet	EC1 EC2
Easy of Physical Access	Physical Access	EP
Identity Requirement	Identity Requirement	IR
Necessity of Training	Necessity of Training	NT
Fun and Concentration	Pleasure of Study Keeping Concentration	FC1 FC2

In the first factor analysis, the items hypothesized a prior to measure Perceived Usefulness loaded as predicted. The two items used to measure Fun and Concentration also loaded on a single factor as predicted. The three items used to

measure Social Influence also loaded on a single factor as predicted. The two items used to measure Ease-of-Use also loaded on a single factor as predicted. But the one item(EC1) predicted to measure Ease-of-Control also loaded on that factor. The one item(EC2) predicted to measure Ease-of-Control, the one item predicted to measure Necessity of Training, and the item predicted to measure Ease-of-Physical Access loaded on a single factor. Finally Identity Requirement cross-loaded with both of constructs of Social Influence and Ease-of-Control, 0.703 and 0.629, respectively. Therefore this item was eliminated from subsequent analysis.

In the second factor analysis, performed without the item that was dropped, factor patterns remained the same as in the first except for the item of the Ease-of-Physical Access construct. The item cross loaded with both Ease-of-Use and Ease-of-Control. Therefore, because the item cross-loaded, it was eliminated from subsequent analyses.

In the third and final factor analysis was performed without dropped item in the second analysis. The two items used to measure Ease-of-Use, the two items predicted to measure Ease-of-Control and the item predicted to measure Necessity of Training loaded on a single factor,

The final factor analysis procedure resulted in four factors with Eigenvlaues greater than 1.0. The four factors explained 89.004% of the variance (<Table 3>). Two of the items did not load on any factor and dropped from the analysis.

〈Table 3〉 Extraction Sums of Squared Loadings

Factors	Eigenvalues	% of the Variance	Cumulative %
Factor1	4.210	30.452	30.452
Factor2	3.624	24.935	55.387
Factor3	2.604	17.623	73.010
Factor4	2.439	15.994	89.004

This study examined Kaiser's measure of overall sampling adequacy and a measure of the sampling adequacy for each indicator. This measure, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is a popular diagnostic measure. KMO provides a means to access the extern to which the indicators of a construct belong together [17]. That is, it is a measure of the homogeneity of variables. A higher value of KMO is desired. KMO measure with less than 0.50 is unacceptable. Table 9 shows that KMO of this factor analysis is 0.565.

This study ran the Bartlett's test for identifying and evaluating the factor solution. Bartlett's test is to assess whether or not the correlation matrix is appropriate for factoring. The Bartlett's test examines the extent to which the correlation matrix departs from orthogonality [6][17]. For this data set, the Bartlett's test statistic is highly significant ($p<0.000$), implying that the correlation matrix is not orthogonal i.e. the items are correlated among themselves and is, therefore, appropriate for factoring (<Table 4>).

〈Table 4〉 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.648	
Bartlett's Test of Sphericity	Approx. Chi-Square	847.315
	d.f.	76
	sig.	.000

Cronbach coefficient alphas were calculated for each of four factors to access the internal reliability of the factors. Cronbach alphas of at least 0.65 were used to identify factors with high degree of internal consistency of the constructs [12][18]. The four factors were then subjected to the Cronbach coefficient alpha test to determine internal reliability. Four factors were deemed acceptable with coefficient alphas of at least 0.65. Table 5 shows the four factors, Cronbach alphas, and the items loading on them.

〈Table 5〉 Operationalization of Research Variables

Labels	Items	Value & Usefulness (0.8792)*	Pleasure of Study (0.9316)*	Social Influence (0.8936)*	Convenience and Easiness (0.9081)*
PU3	Enhancing Performance	0.937			
PU1	Avoiding Lecturers	0.923			
PU2	Finding Valuable Resources	0.892			
FC2	Keeping Concentration		0.859		
FC1	Pleasure of Study		0.798		
SI2	Lecturers			0.948	
SI1	Friends			0.835	
SI3	Media			0.781	
EU1	Easy to Find Information				0.908
EC2	Knowledge on Internet				0.888
EC1	Convenient Search Engine				0.859
EU2	Easy to Use				0.813
NT	Necessity of Training				0.801

* Cronbach alpha coefficient

Once four factors had been identified, a mean was calculates for each factor and used in a multivariate test of significance to determine factor independence. All tests were performed as a two-tailed test using an alpha of 0.05 for the level of significance. All four factors were determined to be significant at the 0.05 level. <Table 6> lists the results of the Pillai's Trace test and related multivariate tests. Sharma[17] recommends Pillai's Trace to test multivariate significance as the test statistic based on it is the most robust and have adequate power to detect true distinction under different conditions. The statistical response to the Pillais' Trace as shown in <Table 6> implies that significant distinctions in the factors exist.

〈Table 6〉 Multivariate Test of Significance

Test Names	Value	F	Hypothesis D.F	Error of D.F.	Significance
Pillai's Trace	0.973	2526.537*	4.000	59.000	0.000
Wilks' Lambda	0.014	2526.537*	4.000	59.000	0.000
Hotelling's Trace	105.473	2526.537*	4.000	59.000	0.000
Roy's Largest Root	113.903	2526.537*	4.000	59.000	0.000
*Exact statistics					
Factors		Sum of square	Mean Square	F	Significance
Factor1		1768.362	1768.362	1293.748	0.000
Factor2		893.564	893.564	2528.209	0.000
Factor3		1291.341	1291.341	947.626	0.000
Factor4		903.657	903.657	1251.384	0.000

5. Ex Post Factor Assessment

In order to determine whether there was any significant difference in the strength among factors, an one-way ANOVA test was performed. The result is presented in the <Table 7>. There was significant difference at the level of 0.01. Value & Usefulness with the highest mean value (4.2333) is the factor the strongest influencing the Web usage.

〈Table 7〉 ANOVA between Factors

Factors	Means(S.D)	F
Value & Usefulness	4.2333(.7760)	28.006*
Pleasure of Study	3.8797(.6431)	
Social Influence	3.1389(.5503)	
Convenience and Easiness	3.3119(.7.405)	

* The mean difference is significant at the .05 level

In post-hoc test for significant differences at the $p<0.05$ level between factors, Tukey HSD test in Table 8 shows that four pairs of factors is significantly different each other in term of strength of influence. But in two pairs of factors any differences could not be founded.

〈Table 8〉 Tukey HSD Test for Multiple Comparisons

Factor#	Factor#	Mean Difference	95% Confidence Level
1	2	0.3436	0.5723 to 0.1149
	3	1.0944*	1.5835 to 0.6053
	4	0.9214*	1.3954 to 0.4476
2	3	0.7408*	1.0652 to 0.4164
	4	0.5678*	0.8624 to 0.2732
3	4	-0.1730	-0.2483 to -0.0977

* The mean difference is significant at the .05 level

6. Conclusion

This paper found out four critical constructs that university students access the internet for their schoolwork. First, Value and Usefulness was the most important reason for university students to access education-related web for their study and enhancing their performance. By using the Internet, they can avoid meeting librarians and lecturers, and also they found and get academic information, which are important to do their study. With the information from the Internet, they could enhance their ability to do schoolwork.

Secondly, they access the internet that they could concentrate on their schoolwork and do their study with pleasure. While interacting with the Web, they did not realize the time

elapsed and any noise, which helped them focus on their study. At the same time, the Web gave students pleasure of study, stimulates their academic curiosity, lead to their academic exploration, and arise their academic imagination.

Third, social environment of using the Internet has an effect on students accessing the Web for their schoolwork. Their peers use the Internet to increase their academic ability and performance and lecturers require them to use the Internet for their classes, which means accessing the Web is necessary for studying. Many media cover articles on the Web, which leads students to use the Internet.

The last construct is that students could find and get information on their field of study with easiness and without much training to use the Internet. Most of the respondents had complete control over how to use the Web and what sites they visit. They had no problem with using the Internet.

While finding constructs, this paper showed a process of construct validation, which could apply to other fields of research on validating instruments to measure human perception.

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