College Students' Online Information Commitments and the Role of Internet-Specific Epistemological Beliefs

Chuan-Hsiang Yeh[1*] and Chin-Chung Tsai[2]
[1] *Graduate Institute of Applied Science and Technology, National Taiwan University of Science and Technology, Taiwan*
[2] *Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taiwan*
[*]leo168389@gmail.com

Abstract: This study aims to examine the relationships between college students' online information commitments and their Internet-specific epistemological beliefs. Two instruments, the Information Commitments Survey (ICS), including six constructs (Multiple sources, Authority, Content, Technical, Elaboration, and Match) and the Internet-Specific Epistemological Questionnaire (ISEQ), including four constructs (Certainty, Simplicity, Source, and Justification), were utilized for collecting the responses from 368 Taiwanese undergraduates. The exploratory factor analyses showed that there was adequate reliability in the two questionnaires. Correlation analyses found students' online information commitments and their Internet-specific epistemological beliefs to be related to each other. The regression analyses indicated that college students' Internet-specific epistemological beliefs were essential predictors of their online information commitments.

Keywords: *Internet-specific epistemological beliefs, Online information commitments*

1. Introduction

Epistemology is a branch of philosophy addressing the issues such as what knowledge is and how knowledge is acquired. Hofer and Pintrich (1997) reviewed a sequence of research focusing on epistemological development and epistemological beliefs by then and proposed two categories representing the core structure of individuals' epistemological theories; one was the nature of knowledge comprising two constructs- certainty of knowledge and simplicity of knowledge, and the other was the nature of knowing comprising two constructs- source of knowledge and justification of knowing.

Hartley and Bendixen (2001) claimed that the importance of epistemological beliefs might be even great in new technological learning environments than in traditional ones. Along with the coming of Internet era, Bråten et al. (2005) developed a measure that specifically focused on epistemological beliefs about Internet-based knowledge and knowing based on Hofer and Pintrich's (1997) theoretical model of personal epistemology. They suggested two factors labels General Internet Epistemology and Justification for Knowing in the final 18-item questionnaire. General Internet Epistemology, consisted of 14 items, integrated the beliefs concerning the certainty, simplicity, and source of Internet-based knowledge; Justification for Knowing, same with the previous, reflected the idea concerned the critical evaluation of Internet-based knowledge.

Information commitments referred to the evaluative standards for Web-based information. Tsai (2004) proposed a theoretical framework of information commitments by

interviewing individually two experts and ten college students. Derived from interview data, he categorized them into three areas that each has two possible orientations: (1) Multiple sources versus Authority as standards for correctness; (2) Content versus Functional as standard s for usefulness; (3) Elaboration & Exploration versus Match as searching strategies. The former in each pair was considered to be more sophisticated.

When more and more learning activities are connected with the Internet nowadays, it seems more and more important to learn more students' ideas and behaviors on the Internet. The purpose of this study is to examine the predictability of college students' Internet-specific epistemological beliefs for their online information commitments in Taiwan and the following questions were investigated:

(1) What are the relationships between the college students' online information commitments and their Internet-specific epistemological beliefs?

(2) Can college students' Internet-specific epistemological belies be used to make predictions about their online information commitments? And how?

2. Method

2.1 Sample

The sample of this study included 368 volunteer college students in Taiwan with the average ages of 21.14 ranging from 18 to 26 (S.D.=1.53), of which 192 (52.2%) were female and the remaining 176 (47.8%) were male. All the participants had the experience of information searching on Internet for their academic tasks from their self reports. By and large, they were fit in with our prerequisites as the subjects of examination in this study.

2.2 Instrument

To assess the subjects' epistemological beliefs and online information commitments, two instruments were implemented in this study. First, the Information Commitment Survey (ICS) developed by Wu and Tsai (2005a) was adopted for the investigation of college students' online information commitments. The ICS based on the prior qualitative analysis of Tsai (2004) has been proven with sufficient reliability for assessing students' online information commitments in the line of research (e.g., Wu & Tsai 2005a, 2005b, 2007) and was designed with a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The following delineates briefly about the six constructs with corresponding example items provided:

1) *Multiple sources as correctness scale (MS)*: measuring the extent to which students will evaluate the correctness of online information by consulting various websites, people, books, or other references when they search for Web information. (One sample item: When I view some information on the Web with which I am unfamiliar, I will discuss with teachers or peers, and then to judge whether the information is correct.)
2) *Authority as correctness scale (AU)*: measuring the extent to which students will evaluate the correctness of online information by the authority or reputation of the websites where it comes from. (One sample item: When I view some information on the Web with which I am unfamiliar, I will believe in its accuracy if the information is posted infamous Web sites.)
3) *Content as usefulness scale (CO)*: measuring the extent to which students will evaluate the usefulness of online information by its fitness and relevancy when they search for Web information. (One sample item: When I view or navigate information on the Web, if its content fits my searching goal, I will think the information is useful to me.)

4) *Technical issues as usefulness scale (TE)*: measuring the extent to which students will evaluate the usefulness of online information by the ease of access and the way it presents on the Internet. (One sample item: When I view or navigate information on the Web, if it is presented by animation, I will think the information is useful to me.)
5) *Elaboration as searching strategy scale (EL)*: measuring the extent to which students will look for the information on the Internet with much attention to numerous parts or details. (One sample item: When I search for information on the Web, I am used to summarize a variety of information.)
6) *Match as searching strategy scale (MA)*: measuring the extent to which students will use only a single set of keywords to find out a single Web that conformed best to the goal when they search for Web information. (One sample item: When I search for information on the Web, I usually only use a search engine to find the most-fit Web sites or pages.)

The second instrument of this study was mainly modified from the Internet-Specific Epistemological Questionnaire (ISEQ) developed by Bråten et al. (2005). Bråten et al. proposed four hypothesized dimensions –Certainty of Internet-based knowledge (Certainty), Simplicity of Internet-based knowledge (Simplicity), Source of Knowledge (Source), and Justification of knowing (Justification), which were extended from Hofer and Pintrich's (1997) theoretical model of personal epistemology.

We revised the ISEQ by adding new items after consulting two educational experts for trying to separate the indistinct aspect of General Internet Epistemology in which 3 dimensions got mixed in the study of Bråten et al. (2005). The revised version of questionnaire on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) was designed from the sophisticated perspective, with higher scores assumed to represent more sophisticated Internet-specific epistemological beliefs. The following delineates briefly the four constructs and corresponding example items comprised in the revised version of ISEQ:

1) *Certainty of Internet-based knowledge scale (CE)*: measuring the extent to which students think knowledge existing on the Internet to be tentative, unsettled and evolving rather than true, accurate, and certain. (One sample item: The truth about every issue raised in my classed is located on the Internet. [Reversed])
2) *Simplicity of Internet-based knowledge scale (SI)*: measuring the extent to which students think knowledge existing on the Internet to be involved or mixed concepts instead of a heap of specific truths. (One sample item: The most important aspect of the Internet is that it contains so many specific facts about what I am studying in my classes. [Reversed])
3) *Source of Knowledge (SO)*: measuring the extent to which students think knowledge to be constructed by the self rather than originate outside the self and reside in the Internet, from which it can be transmitted. (One sample item: The Internet can provide me with most of the knowledge I need to succeed in my courses. [Reversed])
4) *Justification of knowing (JU)*: measuring the extent to which students accept knowledge on the Internet by reasoning or consulting other reference sources of knowledge rather than no any judgment.(One sample item: I evaluate course-related knowledge claims that I encounter on the Internet by checking more knowledge sources about the same topic.)

2.3 Data Analysis

To achieve the objectives of this study, the exploratory factor analysis, correlation analysis, and regression analyses were employed as the statistical methods for data analysis. The exploratory factor analysis was utilized to explore the measurement structures of these two

instruments on online information commitments and Internet-specific epistemological beliefs individually. Next, examine what the mutual relationships exist among constructs through the correlation matrix. Then, stepwise multiple regression analyses were used to find out the role of Internet-specific epistemological beliefs on the predictability of online information commitments.

3. Results and Discussion

The results of analysis of data collected from 368 college students in Taiwan will be presented in this section.

3.1. Factor analysis on the Information Commitment Survey (ICS)

To examine the structure of college students' online information commitments, the exploratory factor analysis (EFA) with the factor extraction method of principle components and the oblique rotation method of Varimax was utilized. An item was classified under some specific factor only when on which its factor loading more than .50 and less than .50 on all the others, or cancelled. 29 items were kept at the end, and six factors were extracted with the total explained variance of 66.91%. Final results with all means, standard deviations, and factor loadings in each factor are shown in Table 1. The reliability coefficients of these six extracted dimensions were respectively .73 (Multiple Sources), .85 (Authority), .93 (Content), .70 (Technical), .88 (Elaboration), and .85 (Match), and Cronbach's α value of the whole questionnaire was .88. All the data revealed that the ICS was sufficiently reliable for assessing college students' online information commitments.

Table 1 The loading structure of the Information Commitment Survey

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1 : Multiple Sources (MS), α=.73, mean=5.40, S.D.=0.86						
MS1	.78					
MS2	.79					
MS3	.47					
Factor 2 : Authority (AU), α=.85, mean=5.07, S.D.=0.87						
AU1		.64				
AU2		.69				
AU3		.67				
AU4		.65				
AU5		.75				
AU6		.73				
AU7		.73				
Factor 3 : Content (CO), α=.93, mean=5.79, S.D.=0.79						
CO1			.77			
CO2			.78			
CO3			.82			
CO4			.83			
CO5			.79			
Factor 4 : Technical (TE), α=.70, mean=4.98, S.D.=0.93						
TE1				.53		
TE2				.78		
TE3				.71		
TE4				.68		
Factor 5 : Elaboration (EL), α=.85, mean=3.50, S.D.=1.39						
EL1					.77	
EL2					.80	
EL3					.79	

EL4	.61	
EL5	.75	
EL6	.57	
EL7	.73	
Factor 6 : Match (MA), α=0.81, mean=3.31, S.D.=0.67		
MA1		.84
MA2		.86
MA3		.78

Overall α = .88; total variance explained = 66.91% (n=368)
Factor loadings less than 0.50 were hidden.

3.2. Factor analysis on the Internet-Specific Epistemological Questionnaire (ISEQ)

Similar way to examine the structure of college students' Internet-specific epistemological beliefs, the exploratory factor analysis (EFA) with the factor extraction method of principle components and the oblique rotation method of Varimax was utilized again. The same rules with respect to factor loadings for items selection mentioned in section 3.1 were followed. The number of items kept in the last revision of questionnaire was 14, and four factors were extracted with the total explained variance of 69.66%. Final results with all means, standard deviations, and factor loadings in each factor are shown in Table 2. The reliability coefficients of these four extracted dimensions were respectively .88 (Certainty), .85 (Simplicity), .85 (Source), and .87 (Justification), and Cronbach's α value of the whole questionnaire was .87. All the figures revealed that the revised ISEQ was sufficiently reliable for assessing college students' Internet-specific epistemological beliefs.

3.3. Correlations between online information commitments and Internet-specific epistemological beliefs

Table 2 The loading structure of the revised Internet-Scientific Epistemological Questionnaire

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1 : Certainty (CE), α=.88, mean=4.33, S.D.=1.08				
CE1	.52			
CE2	.52			
CE3	.77			
CE4	.80			
CE5	.90			
CE6	.85			
Factor 2 : Simplicity (SI), α=.85, mean=3.36, S.D.=1.02				
SI1		.73		
SI2		.83		
SI3		.76		
SI4		.78		
Factor 3 : Source (SO), α=.85, mean=3.57, S.D.=1.16				
SO1			.74	
SO2			.73	
SO3			.85	
SO4			.78	
Factor 4 : Justification (JU), α=.87, mean=5.65, S.D.=0.77				
JU1				.80
JU2				.90
JU3				.85
JU4				.82

Overall α = .87; total variance explained = 69.66%. (n=368)
Factor loadings less than 0.50 were hidden.

To examine the relationships between online information commitments and Internet-specific epistemological beliefs, correlation analyses were employed and the result matrix with all the factors of the two questionnaires implemented, extracted in the previous procedure of EFA, is presented in Table 3. The figures in each matrix cell indicated the Pearson's product moment correlation coefficient correspond to the dimensions of its row and column. And the matrix indicated that there existed mutual relationships with statistically significant degree mostly between the ICS and the revised ISEQ.

According to the correlation matrix, it was revealed that the dimensions of Simplicity in ISEQ, as well as Certainty and Source were all negatively correlated with each dimension in ICS except that no statistical significance was found on the factors of Content and Elaboration. Furthermore, there were positive correlations with statistical significance between the dimension of Justification in ISEQ and each dimension in ICS, but negative for the dimension of Match.

Table 3 The correlation matrix between Online Information Commitments and Internet-Specific Epistemic Beliefs

	Certainty (CE)	Simplicity (SI)	Source (SO)	Justification (JU)
Multiple Sources (MA)	-.11*	-.29***	-.17**	.44***
Authority (AU)	-.48***	-.33***	-.26***	.21***
Content (CO)	-.09	-.28***	-.15**	.48***
Technical (TE)	-.24***	-.21***	-.24***	.19***
Elaboration (EL)	-.10	-.26***	-.22***	.43***
Match (MA)	-.46***	-.15**	-.23***	-.28***

*: p <.05, **: p <.01, ***: p <.001; (n=368)

3.4.Stepwise regression analysis for explaining and predicting

The stepwise multiple regression method with the constructs of ISEQ as predictor variables and the constructs of ICS as dependent variables was further used to explain and predict. The rules for establishing each regression equation were that only the independent variable statistically significantly correlated with the corresponding dependent variable was eligible as predictors. The multiple regression models of the Online Information Commitments are illustrated in Table 4, and all the explanatory power of estimation was more than 20% with an exception of 10% for predicting Technical.

The results revealed that Justification was a positive predictor for all the ICS dimensions, but negative for Match. Moreover, Certainty and Simplicity were negative predictors of three more sophisticated dimensions in ICS- Multiple Sources, Content, and Elaboration, and three more naïve dimensions in ICS- Authority, Technical, and Match, which were categorized in the Tsai's (2004) framework.

The phenomenon was worthy paying more attention that students with the more sophisticated epistemological beliefs were not necessarily to have more sophisticated online information commitments in the Internet environment. One of the possible reasons was our results above were limited by the framework of Internet-specific epistemological beliefs. So there were several questions for us to consider further: Was it proper to apply the conceptualization of personal epistemology on which we based our measure directly to the Internet-specific environment? 'Internet-specific epistemological beliefs' was a subset of 'epistemological beliefs', or they were two kinds of constructs just only with an intersection of common dimensionality. Those should be addressed in the future work, especially to find out whether another dimensionality might be identified for personal epistemology in the Internet-specific environment.

Table 4 Stepwise regression model of the Online Information Commitments

Criterion	Predictor(s)	B	S.E.	Beta	t	R^2
MS	(Constant)	3.50	.35		10.00***	.23
	SI	-0.17	.04	-.20	- 4.35***	
	JU	0.44	.05	.40	8.42***	
AU	(Constant)	5.29	.32		16.72***	.28
	CE	-0.40	.04	-.50	-11.14***	
	JU	0.27	.05	.24	5.34***	
CO	(Constant)	3.73	.31		11.89***	.26
	SI	-0.15	.04	-.19	- 4.17***	
	JU	0.45	.05	.44	9.69***	
TE	(Constant)	4.76	.39		12.10***	.10
	CE	-0.17	.05	-.19	- 3.35**	
	SO	-0.10	.05	-.12	- 2.05*	
	JU	0.27	.06	.19	3.74***	
EL	(Constant)	3.91	.33		12.04***	.22
	SI	-0.09	.04	-.12	- 2.07*	
	SO	-0.07	.04	-.11	- 1.98*	
	JU	0.39	.05	.39	8.24***	
MA	(Constant)	8.50	.51		16.72***	.27
	CE	-0.56	.06	-.44	- 9.81***	
	JU	-0.45	.08	-.25	- 5.63***	

*: p <.05, **: p <.01, ***: p <.001; (n=368)

CE: Certainty, SI: Simplicity, SO: Source, JU: Justification;

MS: Multiple Sources, AU: Authority, CO: Content, TE: Technical, EL: Elaboration, MA: Match.

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