

University students' online academic help seeking: The role of self-regulation and information commitments

Kun-Hung Cheng ^{a,b,*}, Jyh-Chong Liang ^b, Chin-Chung Tsai ^c

^a Digital Content Production Center, National Chiao Tung University, #1001 University Rd., Hsinchu, 300, Taiwan

^b Graduate Institute of Applied Science and Technology, National Taiwan University of Science and Technology, #43, Sec.4, Keelung Rd., Taipei, 106, Taiwan

^c Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, #43, Sec.4, Keelung Rd., Taipei, 106, Taiwan

ARTICLE INFO

Article history:

Accepted 28 February 2012

Keywords:

Online academic help seeking
Self-regulated learning
Information commitments
Information searching
Online query
Evaluative standard

ABSTRACT

Students' online academic help seeking (OAHS) can be facilitated by the aid of technology, but improvement in OAHS may also involve personal variables such as self-regulated learning (SRL), and 'information commitments' (ICs), which are evaluative standards and strategies of online information. Accordingly, three instruments – an OAHS, an SRL, and an ICs questionnaire – were adopted to explore the role of SRL and ICs in the OAHS of 328 university students in Taiwan. The results verify that the students' perceived SRL mediates the relationships between their perceptions of their ICs and OAHS to some degree. The enhancement of learners' SRL may encourage their use of sophisticated ICs when involved in OAHS. When the students made informal OAHS queries, however, they tended to use less sophisticated strategies, and the significance of their perceived SRL was not apparent. This study contributes to a better understanding of university students' online academic help seeking.

© 2012 Elsevier Inc. All rights reserved.

1. Introduction

1.1. Online academic help seeking

In traditional classroom contexts, many students do not actively seek help with their academic problems, possibly because they are embarrassed to publicly disclose that they need help or see that need as a threat to their self-esteem (Karabenick, 1998, 2003; Ryan & Pintrich, 1997). Students who display a negative affect (e.g., anxiety) in the classroom also tend to avoid seeking help (Ryan, Patrick, & Shim, 2005). However, researchers have investigated the support that the online environment provides for improving learners' help seeking behaviors (Mäkitalo-Siegl, Kohnle, & Fischer, 2011; Puustinen, Bernicot, & Bert-Erboul, 2011). For example, Mäkitalo-Siegl et al. (2011) found that the web-based learning environment had positive influences on learners' help seeking processes, especially in cases with a low level of teacher guidance during computer-supported collaborative inquiry learning. Through the analysis of written homework-related help seeking messages in a web forum, Puustinen et al. (2011) also found that students' help requests could be encouraged with a time delay between the request and the reply. In other words, the online environment provides new possibilities for academic help seeking.

In terms of online academic help seeking (OAHS), Cheng and Tsai (2011) identified three types of OAHS behaviors: (1) information searching (e.g., searching for information to solve academic problems on Google or relevant websites), (2) formal query (e.g., emailing teachers or tutors to request help), and (3) informal query (e.g., making online requests to peers or unknown experts for academic help). Their study found that university students were less inclined to engage in OAHS but showed a high confidence in it. That is, even though the online environment offers abundant resources, university students seem to have less experience with and preference for using these resources to practice OAHS. To enhance students' tendencies for academic help seeking, Cheng and Tsai (2011) therefore suggested that instructors utilize several online channels (e.g., an e-tutor system or social network sites).

In addition to the support of online channels, this study further proposes that improvement in learners' OAHS behaviors may involve other personal variables. For instance, with regard to the plentiful resources on the Internet, students may apply certain evaluative standards and strategies for selecting or filtering information when they seek help online. Moreover, because researchers have suggested that help seeking can be conceptualized as an important form of behavioral self-regulation (Karabenick & Newman, 2006; Pintrich, 2004; Pintrich & Zusho, 2002), students' perceived self-regulation may play a role in their OAHS behaviors. As a result, the variables mentioned above, such as self-regulation and personal evaluative standards and strategies for accessing online information, are likely related to students' OAHS and need to be probed further with their OAHS.

* Corresponding author at: Graduate Institute of Applied Science and Technology, National Taiwan University of Science and Technology, #43, Sec.4, Keelung Rd., Taipei, 106, Taiwan. Tel.: +886 3 5712121#50161.

E-mail addresses: kuhu@mail.nctu.edu.tw (K.-H. Cheng), alj@mail.ntust.edu.tw (J.-C. Liang), cct sai@mail.ntust.edu.tw (C.-C. Tsai).

1.2. Information commitments

Because learners' evaluative standards and searching strategies for web materials are significant indicators of their searching processes in online environments (Wu & Tsai, 2005, 2007), these factors may also relate to learners' other online learning activities, such as OAHS. For example, students may judge the online resources derived from websites, teachers, or unknown experts when they are involved in help seeking to meet course-related needs.

Tsai (2004) refers to learners' 'information commitments' (ICs) as both a set of evaluative standards utilized by users to assess the accuracy and usefulness of Internet-based resources and the information searching strategies applied by users in online environments. Based on the theoretical framework proposed by Tsai (2004), these ICs consist of three aspects: standards for accuracy, standards for usefulness, and searching strategies. Each of the aspects includes two possible differing orientations:

1. Standards for accuracy of online information: 'Multiple sources' refers to the extent to which students evaluate the accuracy of information by comparing it to resources obtained from other websites, peers, or printed materials. 'Authority' refers to the extent to which students examine the accuracy of information mainly according to the reputability of the website or source.
2. Standards for usefulness of online information: 'Content' refers to the extent to which students validate the usefulness of information retrieved on the Internet according to the relevancy of its content. 'Technical' refers to the extent to which students judge the usefulness of the information in terms of the ease of retrieving, searching for and obtaining the resources from the Internet.
3. Online information searching strategy: 'Elaboration' refers to the extent to which students use purposeful (i.e., metacognitive) thinking to integrate relevant information from several websites to fulfill their needs. 'Match' refers to the extent to which students intend to find the most fruitful and relevant information from a few websites to fit their needs.

By interviewing a group of university students, Tsai (2004) concluded that 'multiple sources,' 'content,' and 'elaboration' were the more advanced ICs employed by experts. 'Authority,' 'technical,' and 'match,' by contrast, were viewed as the less sophisticated ICs used by novices. For example, experienced learners integrate materials they obtain from multiple sources, while novice learners possibly rely on the information they access from certain authoritative sources. Liang and Tsai (2009) concluded that university students with more Internet experience are inclined to use 'elaboration' as a searching strategy, but may also simultaneously employ 'multiple sources' and 'authority' as standards for correctness and 'content' and 'technical' as standards for usefulness. Similar results were found in Wu and Tsai's (2005) study, which indicated that mixed evaluative standards may be applied by university students when searching for information in Internet-based environments. The results implied that university students may utilize assorted sets of standards (i.e., both advanced and less sophisticated) for examining the correctness and usefulness of the online information.

In Wu and Tsai's (2005) study, the evaluative standards for accuracy and usefulness were categorized as an internal aspect, while the searching strategies were viewed as an external aspect. The researchers also proposed a structural model to address the fact that the internal aspect of advanced standards (either 'multiple sources' or 'content') had positive effects on the external aspect of advanced searching strategies ('elaboration'), and vice versa. Therefore, the current study considered that the ICs of university students can be alternatively examined from two aspects: criteria (internal aspect) and strategies (external aspect). Furthermore, this study assumed that 'multiple sources' and 'content' could be classified into 'advanced criteria,' while 'authority' and 'technical' could be categorized into

'naive criteria.' This study also investigated the aspect of strategies by students' perceived 'elaboration' (advanced strategy) and 'match' (less sophisticated strategy).

1.3. Self-regulated learning

Several studies have suggested that help seeking is a behavioral self-regulated strategy that is also beneficial for learning (Karabenick & Newman, 2006; Pintrich, 2004; Pintrich & Zusho, 2002). Self-regulated learning (SRL) refers to an active and constructive process in which an individual is cognitively, motivationally, and behaviorally engaged in his/her own learning (Zimmerman, 2001, 2002). In general, SRL is assumed to be represented by the four phases of planning, monitoring, controlling, and reflecting in a time-ordered sequence of learning (Pintrich, 2000, 2004). According to Pintrich (2004), (1) phase 1 – planning – involves an activation of prior content knowledge or metacognitive knowledge of goal setting for learning tasks or context, (2) phase 2 – monitoring – refers to various monitoring processes of metacognitive awareness for changing learning tasks or context and self-needs, (3) phase 3 – controlling – engages efforts to select and adapt cognitive strategies for learning or thinking, and (4) phase 4 – reflecting – involves various reactions to make a self-examination and to evaluate learning tasks or contexts.

Although the four phases of SRL represent a general linear structure, researchers have indicated that it is difficult to make a clear distinction between the monitoring (phase 2) and controlling (phase 3) processes based on empirical data collected from learners' responses on instruments such as self-report questionnaires or think-aloud protocols (Pintrich, 2000). With changes in their goals or plans, students may simultaneously or dynamically monitor, control and reflect on their tasks during the learning processes (Pintrich, 2004). That is, the boundaries between phases 2, 3 and 4 are vague. Therefore, the present study assumed that planning (phase 1) could be considered as low-level (basic) SRL, while monitoring (phase 2), controlling (phase 3), and reflecting (phase 4) could all be regarded as high-level (advanced) SRL. Students with low-level SRL only express their preparation in terms of goal setting and planning for learning tasks, whereas those with high-level SRL exhibit practical actions of supervising, regulating and evaluating their learning processes and outcomes.

1.4. The relationships between OAHS, ICs, and SRL

In the last decade, the significance of learners' SRL skills has been emphasized with regard to learning in Internet-based environments (e.g., Chang, 2007; Hodges, 2005; Vighnarajah, Wong, & Abu Bakar, 2009). Because the Internet contains ample information resources and provides flexible time and space for learning, it is likely that students need SRL skills to search for and integrate information from a variety of resources (Rouet, 2006). When accessing online academic information, students who believe the Internet to be a sophisticated knowledge resource in terms of studying relevant facts tend to use SRL strategies to search for and evaluate information (Strømsø & Bråten, 2010). Therefore, the present study presumed that learners' ICs may be related to their SRL while dealing with online resources for academic purposes. Moreover, based on the earlier interpretations, learners' OAHS behaviors were considered to be related to their ICs and SRL. Several studies have also suggested that SRL may be a mediator in the relationships between personal characteristics (e.g., individual demographics) or perceptions (e.g., online course perceptions) and academic performance in both traditional (Pintrich, 2004; Zimmerman, 2001) and digital (Azevedo, 2005; Barnard, Paton, & Lan, 2008) environments. The current study, therefore, attempts to examine whether SRL mediates the relationship between students' ICs and OAHS.

1.5. Taiwan university students' Internet experiences in accessing academic information

According to a survey on broadband usage in Taiwan (Taiwan Network Information Center, 2011), 75.69% of the Taiwanese public (aged 12 years and above) has experience using the Internet. The penetration rate of Internet users aged 15–19 years is 100% (1.68 million) and 99.60% (1.62 million) for those aged 20–24. In other words, most university students in Taiwan have experience using the Internet. Moreover, Tien and Fu (2008) have also reported that in Taiwan, undergraduate students spend approximately 19 h per week using computers, of which 5 h are used for course-related work (e.g., fulfilling academic requirements and searching for information). This indicates that to a certain extent, Taiwan university students have experiences that exhibit their perceived online behaviors, especially when accessing academic-related information on the Internet. Therefore, university students were chosen as the research subjects for the present study.

Moreover, because previous studies have reported university students' perceptions of ICs (e.g., Liang & Tsai, 2009; Wu & Tsai, 2005, 2007) based on general purpose for searching tasks, the present study supposed that it might be interesting to explore what ICs university students possess while retrieving information for academic purposes in online environments. In particular, when university students are involved in seeking help via online channels, their perceived ICs and SRL with regard to academic information accessing may differ from their perceptions regarding general information accessing.

1.6. Research questions

Probing university students' perceived ICs and SRL when accessing online academic information may give a better understanding of their OAHS behaviors. Accordingly, the research questions of the current study are as follows:

1. Are the instruments used in this study reliable for measuring university students' OAHS, ICs, and SRL?
2. What are the university students' OAHS, ICs, and SRL?
3. What are the relationships among the university students' OAHS, ICs, and SRL?
4. What roles do ICs and SRL play in the university students' OAHS behaviors? Does the university students' SRL mediate the relationships between their ICs and OAHS?

2. Method

2.1. Sample

The respondents of this study were 328 university students in Taiwan, of which 174 were males and 154 females. They were either undergraduate or graduate students, whose ages ranged from 19 to 26 years (mean = 21.17, SD = 1.59). In total, 88% of the respondents indicated that their Internet usage exceeded 10 h per week. Most of the students (approximately 84%) also reported accessing academic information through the Internet at least once a week.

2.2. Instruments

In this study, three questionnaires presented with a 7-point Likert scale (from 1, "not at all true," to 7, "very true") were administered to investigate the university students' perceptions of OAHS, ICs, and SRL when they accessed online academic information.

2.2.1. OAHS questionnaire

This study adopted the perceived experiences of the OAHS questionnaire developed by Cheng and Tsai (2011), which consisted of

three scales: *information searching*, *formal query*, and *informal query*. In the original OAHS questionnaire, however, there were only 2 items remaining in the information searching scale. To construct a more valid measurement of OAHS, this study added more items to the information searching scale and further verified the structure of the OAHS questionnaire by factor analysis. The following describes the three scales of the OAHS questionnaire:

1. The *Information searching* scale investigates the extent to which students seek relevant information to solve their academic problems via the Internet (e.g., searching via Google).
2. The *Formal query* scale measures the extent to which students query their teachers or assistants regarding academic problems through online channels (e.g., asking teachers by email).
3. The *Informal query* scale assesses the extent to which students seek help from their peers or unknown experts via the Internet when encountering academic problems (e.g., posting help requests on web forums).

2.2.2. ICs questionnaire

In this study, the ICs questionnaire developed by Wu and Tsai (2005, 2007) was utilized to investigate the students' evaluative standards and searching strategies in the situations of judging online academic information. There were six scales in this questionnaire, including the 'multiple sources as judging correctness scale' (*multiple sources*), the 'authority as assessing correctness scale' (*authority*), the 'content as evaluating usefulness scale' (*content*), the 'technical issues as appraising usefulness scale' (*technical*), the 'elaboration as searching strategy scale' (*elaboration*), and the 'match as searching strategy scale' (*match*). The questions of the six scales were stated with regard to the premise, 'What do you perceive when you access online academic information?' It should be noted that the data gathered from the ICs questionnaire were initially expected to be grouped into the six scales by factor analysis. To further understand the relationships among the students' OAHS, SRL, and perceived levels of standards and strategies of ICs, this study subsequently consolidated *multiple sources* and *content* to form one variable (*advanced criteria*) and combined *authority* and *technical* into another variable (*naive criteria*). Whereas *advanced criteria* and *naive criteria* were classified as evaluative standards, the *elaboration* and *match* scales were retained as strategies for ICs. These are the sample items of the six scales:

1. *Multiple sources*: I retrieve relevant resources from more websites to evaluate whether the information is correct.
2. *Authority*: I agree with its correctness if the information appears on professional (official) websites.
3. *Content*: I consider the information useful to me if it can help me retrieve further relevant information.
4. *Technical*: I think the information is useful to me if it does not take much time to be retrieved.
5. *Elaboration*: I can integrate the information obtained from a variety of websites.
6. *Match*: I usually try to find a best-fit website (or web page).

2.2.3. SRL questionnaire

Based on the SRL scale of the Participant Perception Inventory-Internet versus Traditional Learning (PPI-IvT) questionnaire proposed by Lee and Tsai (2011), this study developed an SRL questionnaire to explore the students' perceptions of SRL when they were involved in accessing online academic information. In the original PPI-IvT questionnaire, there were 7 items in the SRL scale, including sample questions for the four phases of SRL (i.e., planning, monitoring, controlling, and reflecting). Based on the aforementioned discussion (Pintrich, 2000, 2004) that SRL may present at two levels (i.e., low and high), the current study added more items to the SRL factor of the PPI-IvT questionnaire to generate a new SRL questionnaire for extracting probable scales. Consequently, the SRL questionnaire developed in

this study was expected to consist of two scales, namely *low SRL* (i.e., the first phase of SRL proposed by Pintrich (2004)) and *high SRL* (i.e., the second to fourth phases of SRL suggested by Pintrich (2004)). The descriptions of the two scales of the SRL questionnaire are presented below:

1. The *Low (basic) SRL* scale measures the extent to which students have an awareness of their insufficient academic knowledge and activate themselves to plan or set goals for relevant learning tasks in an online environment.
2. The *High (advanced) SRL* scale assesses the extent to which students take action to monitor their online learning processes for course-related purposes, use applicable strategies to gather relevant online resources, and evaluate their outcomes.

3. Results and discussion

3.1. Factor analysis for OAHS, ICs and SRL questionnaires

To validate the OAHS, ICs and SRL questionnaires, the present study performed an exploratory factor analysis (EFA) using the principle component method. The results of the factor analysis show that the students' responses on the OAHS questionnaire were grouped into three factors: 'information searching,' 'formal query,' and 'informal query,' exactly in accordance with those factors identified by Cheng and Tsai (2011). There were 3, 4, and 4 items retained in these three scales, respectively. Table 1 reveals that the three factors explained a total of 66.52% of the variance. The reliability (α) coefficients for the three scales were 0.62, 0.85, and 0.78, respectively, and 0.82 for the overall α value, suggesting that they are sufficiently reliable for assessing students' perceptions of OAHS.

In Table 2, the factor analysis of the students' responses to the ICs questionnaire reveals that a total of 21 items corresponded to the six factors: 'multiple sources' (3 items, $\alpha = 0.80$), 'authority' (3 items, $\alpha = 0.83$), 'content' (5 items, $\alpha = 0.94$), 'technical' (3 items, $\alpha = 0.76$), 'elaboration' (4 items, $\alpha = 0.90$), and 'match' (3 items, $\alpha = 0.87$). The overall α coefficient for these scales was 0.89. These factors were consistent with those found in previous studies (Liang & Tsai, 2009; Wu & Tsai, 2005, 2007), accounting for 77.14% of the total variance. Hence, these results indicate that the ICs questionnaire is an adequate instrument to reflect the students' ICs when accessing academic online information.

As shown in Table 3, there were, respectively, 4 and 6 items extracted under two factors in the SRL questionnaire: 'low SRL' and 'high SRL,' with a total of 63.18% of the variance explained. This is consistent with the assumption of this study and identifies two levels in

Table 1
Rotated factor loadings and Cronbach's α values for the OAHS scales (n = 328).

Item	Factor 1: Information searching	Factor 2: Formal query	Factor 3: Informal query
Information searching (IS), $\alpha = 0.62$			
IS1	0.83		
IS2	0.56		
IS3	0.79		
Formal query (FQ), $\alpha = 0.85$			
FQ1		0.91	
FQ2		0.86	
FQ3		0.56	
FQ4		0.87	
Informal query (IQ), $\alpha = 0.78$			
IQ1			0.82
IQ2			0.72
IQ3			0.76
IQ4			0.67
% of variance	16.63	25.14	24.76

Overall $\alpha = 0.82$, total variance explained = 66.52%.

Table 2
Rotated factor loadings and Cronbach's α values for the ICs scales (n = 328).

Item	Factor 1: Multiple sources	Factor 2: Authority	Factor 3: Content	Factor 4: Technical	Factor 5: Elaboration	Factor 6: Match
Multiple sources (MS), $\alpha = 0.80$						
MS1	0.58					
MS2	0.80					
MS3	0.75					
Authority (AU), $\alpha = 0.83$						
AU1		0.82				
AU2		0.75				
AU3		0.82				
Content (CO), $\alpha = 0.94$						
CO1			0.78			
CO2			0.77			
CO3			0.81			
CO4			0.80			
CO5			0.74			
Technical (TE), $\alpha = 0.76$						
TE1				0.83		
TE2				0.79		
TE3				0.67		
Elaboration (EL), $\alpha = 0.90$						
EL1					0.71	
EL2					0.80	
EL3					0.73	
EL4					0.66	
Match (MA), $\alpha = 0.87$						
MA1						0.87
MA2						0.91
MA3						0.86
% of variance	9.68	11.08	20.85	9.93	13.39	12.22

Overall $\alpha = 0.89$, total variance explained = 77.14%.

the students' SRL when they are approaching relevant academic Internet-based materials. The α coefficients for the two scales were 0.80 and 0.87, and the overall α value was 0.89, giving acceptable internal consistency. (A full list of all questionnaire items can be obtained by contacting the corresponding author.)

3.2. Comparisons in the OAHS, ICs and SRL scales

To understand the students' perceptions of their OAHS, ICs, and SRL, this study examined their scores on the OAHS, ICs, and SRL scales

Table 3
Rotated factor loadings and Cronbach's α values for the SRL scales (n = 328).

Item	Factor 1: Low (basic) SRL	Factor 2: High (advanced) SRL
Low (basic) SRL, $\alpha = 0.80$		
SRL1	0.78	
SRL2	0.81	
SRL3	0.68	
SRL4	0.70	
High (advanced) SRL, $\alpha = 0.87$		
SRL5		0.62
SRL6		0.66
SRL7		0.73
SRL8		0.82
SRL9		0.82
SRL10		0.76
% of variance	26.94	36.24

Overall $\alpha = 0.89$, total variance explained = 63.18%.

and conducted within-subject ANOVA and paired t-tests to compare these scores. In the OAHS scales, Table 4 reveals that the students' scores were highest on the 'information searching' (mean value = 5.84) scale and were significantly higher than their scores on the 'formal query' and 'informal query' scales ($F = 254.84, p < 0.001$). In general, the results were similar to Cheng and Tsai's (2011) findings, indicating that university students in Taiwan were relatively more inclined to search for information than to make queries to solve academic problems through online channels. Furthermore, these students showed a greater tendency to ask their teachers or course assistants for help (formal query) than to ask knowledgeable peers or unknown experts for course-related help through the Internet (informal query). Although previous studies have addressed the merits of technical support for seeking help in informal learning environments (e.g., Mäkitalo-Siegl & Fischer, 2011), the students did not seem to perceive the potential advantages provided by a variety of online media from which they could seek experts' help.

From a series of paired t-tests, the results in Table 5 show that the students' scores on 'multiple sources' ($t = 2.79, p < 0.01$), 'content' ($t = 12.36, p < 0.001$), and 'elaboration' ($t = 20.91, p < 0.001$) were significantly higher than their scores on the other three ICs scales. That is, in this study, the students agreed that they often use advanced 'information commitments' rather than employing naive criteria or strategies to process academic online information. Moreover, it is interesting to note that 'match,' the lowest score in the ICs scales, was seldom used by most of the students. This result is also in line with other studies regarding ICs (e.g., Liang & Tsai, 2009; Wu & Tsai, 2005, 2007), suggesting that this generation may be familiar enough with using the Internet that students do not often employ the 'match' strategy to fulfill their academic purposes.

Regarding SRL, the results in Table 5 show that students perceived more 'low SRL' than 'high SRL' ($t = 12.65, p < 0.001$). In other words, when these students accessed academic online information, most of them were more likely to plan relevant learning tasks or prepare applicable strategies to deal with their awareness of inadequate academic knowledge than to undertake practical actions to monitor, control or even reflect on their learning processes and outcomes.

3.3. Correlations among the OAHS, ICs, and SRL scales

Following the research questions, this study conducted Pearson's correlations to examine the relationships among the university students' perceptions of OAHS, ICs, and SRL. As mentioned previously, 'advanced criteria,' 'naive criteria,' 'elaboration,' and 'match' were used as variables to represent students' perceived levels of standards and strategies of ICs. Table 6 reveals that the students' perceptions of 'information searching' for OAHS were highly related to both of the evaluative standards of ICs (i.e., 'advanced criteria' ($r = 0.53, p < 0.001$) and 'naive criteria' ($r = 0.46, p < 0.001$)), but that their perceived 'formal query' and 'informal query' for OAHS had relatively low relationships with these standards of ICs. For example, the coefficients of the correlations between 'formal query' for OAHS and 'advanced criteria' and 'naive criteria' of their ICs were 0.20 ($p < 0.001$) and 0.15 ($p < 0.01$), respectively. Similarly to Wu and Tsai's (2005) study, these results indicate that when searching for online resources to solve academic problems, these students tended to apply mixed evaluative standards. However, when asking for online help, either

Table 5
Comparisons of students' scores on the ICs and SRL scales ($n = 328$).

Scale	Mean	S.D.	t-Value
ICs			
Multiple sources	5.59	0.91	2.79**
Authority	5.44	0.99	
Content	5.74	0.87	12.36***
Technical	4.94	1.22	
Elaboration	5.62	0.94	20.91***
Match	3.54	1.46	
SRL			
Low (basic) SRL	5.53	0.85	12.65***
High (advanced) SRL	5.00	0.90	

*** $p < .001$, ** $p < .01$.

formally or informally, they did not show a strong tendency to use mixed criteria to evaluate the online information.

Moreover, there were significant relationships between the OAHS scales and the 'elaboration' and 'match' scales of ICs (e.g., the coefficients of the correlations between 'elaboration' of ICs and 'information searching,' 'formal query,' and 'informal query' for OAHS were 0.50 ($p < 0.001$), 0.19 ($p < 0.01$), and 0.15 ($p < 0.01$), respectively) but not for the correlation between 'information searching' and 'match.' That is, in terms of strategies for ICs, the students may have also applied mixed strategies (i.e., 'elaboration' and 'match') to select valuable information queried from teachers (formal query) or unknown experts (informal query) through online channels. However, they were likely to utilize 'elaboration' rather than 'match' as a strategy to integrate resources from various websites to complete their OAHS task of information searching.

Considering the relationships between the students' perceptions of OAHS and SRL, Table 6 shows that there were significant correlations between the OAHS and SRL scales, except that 'informal query' was irrelevant to 'low SRL.' For example, the coefficients of the correlations between 'high SRL' and 'information searching,' 'formal query' and 'informal query' for OAHS were 0.18 ($p < 0.01$), 0.29 ($p < 0.001$), and 0.16 ($p < 0.01$), respectively. Because previous studies have suggested that learners' help seeking behaviors can be deemed a form of SRL (e.g., Karabenick & Newman, 2006), the current study sought to verify that in online contexts, students who possess greater self-regulatory perceptions would tend to seek help for academic purposes. However, the 'informal query' for OAHS was only related to the perceptions of 'high SRL' and not to 'low SRL.' These results suggest that the students who perceived a higher level of SRL were inclined to informally request help about course-related problems through the Internet.

In addition, the results in Table 6 reveal that all of the ICs scales significantly correlated with the SRL scales, with the exception of the 'match' scale. It is interesting to note that there were strong relationships between the students' SRL and their sophisticated ICs (i.e., 'advanced criteria' and 'elaboration'), but that there were relatively low correlations between their SRL and naive criteria of ICs. For instance, whereas the coefficients of the correlations between 'advanced criteria' of ICs and 'low SRL' and 'high SRL' were 0.49 ($p < 0.001$) and 0.34 ($p < 0.001$), respectively, the coefficients of the relationships between 'naive criteria' of ICs and 'low SRL' and 'high SRL' were 0.24 ($p < 0.001$) and 0.16 ($p < 0.01$), respectively. The students' perceptions of using 'match' as a strategy when retrieving online academic information did not even relate to their perceived SRL. These results not only confirm the current study's assumption that learners' ICs are related to their SRL when processing Internet-based materials for academic purposes, but also indicate that students with more advanced orientations of ICs may strongly reflect their perceptions of SRL. As far as the strategies of ICs are concerned, 'match' – being a less sophisticated strategy – did not correlate with any level of SRL. In other words, the students who were likely to use simple strategies for finding the best-fit solutions did not display their perceptions of SRL when they accessed academic information in an online environment.

Table 4
Comparisons of students' scores on the OAHS scales ($n = 328$).

Scale	Mean	S.D.	F-value	Post-hoc test
OAHS				
(1) Information searching	5.84	0.91	254.84***	1 > 2 > 3
(2) Formal query	4.35	1.42		
(3) Informal query	4.13	1.44		

*** $p < .001$.

Table 6
Correlations among the OAHs, ICs and SRL scales (n = 328).

	IS	FQ	IQ	Low (basic) SRL	High (advanced) SRL	AC	NC	EL	MA
IS	1								
FQ	0.19***	1							
IQ	0.38***	0.41***	1						
Low (basic) SRL	0.35***	0.15**	0.09	1					
High (advanced) SRL	0.18**	0.29***	0.16**	0.62***	1				
AC	0.53***	0.20***	0.15**	0.49***	0.34***	1			
NC	0.46***	0.15**	0.25***	0.24***	0.16**	0.55***	1		
EL	0.50***	0.19**	0.15**	0.49***	0.40***	0.78***	0.52***	1	
MA	0.05	0.18**	0.39***	−0.09	0.03	−0.10	0.25***	−0.09	1

*** $p < .001$, ** $p < .01$, * $p < .05$.

IS: information searching, FQ: formal query, IQ: informal query, Low (basic) SRL: low level of self-regulated learning, High (advanced) SRL: high level of self-regulated learning, AC: advanced criteria, NC: naive criteria, EL: elaboration, MA: match.

3.4. Path analysis

To understand the roles that students' ICs and SRL play in their OAHs behaviors, the current study conducted a path analysis to examine the relationships between these variables. Through the path analysis, the mediations of the students' SRL between their ICs and OAHs were also explored. As shown in Fig. 1, 'information searching' for OAHs was directly predicted by the 'advanced criteria' ($\beta = 0.24$, $p < 0.01$), 'naive criteria' ($\beta = 0.20$, $p < 0.01$), and 'elaboration' ($\beta = 0.18$, $p < 0.01$) of ICs. The results indicated that the students would not only apply mixed evaluative standards but would also use sophisticated strategies (i.e., 'elaboration') to search for online information for academic help. When adding the SRL variables as mediators between the ICs and OAHs scales, it was found that 'low SRL' mediates the relationships between 'advanced criteria' ($\beta = 0.31$, $p < 0.001$) and 'elaboration' ($\beta = 0.30$, $p < 0.001$) of ICs and 'information searching' ($\beta = 0.17$, $p < 0.01$) for OAHs. In other words, the students who showed a tendency to set their learning goals according to the needs of their academic problems (low SRL) would apply advanced ICs to complete their information searching tasks on the Internet. On the contrary, for the students who only utilized less sophisticated evaluative standards, their perceived SRL did not play a role in the information searching tasks for OAHs.

Moreover, 'match' of ICs directly predicted the students' perceived 'formal query' ($\beta = 0.19$, $p < 0.01$) and 'informal query' ($\beta = 0.38$, $p < 0.001$) for OAHs. These results indicate that the students usually employed 'match' as a strategy to select the information they requested from teachers or knowledgeable peers through online media. The current study considered that in such situations, the students may deem the academic information they receive from formal or informal channels to be a professional suggestion or the fittest solution. Accordingly, it is reasonable for them to commit to those requested resources using the simple strategy of matching their academic needs. However, after taking the mediated effects of SRL into account, it was found that the perceptions of 'high SRL' mediated the relationship between 'elaboration' of ICs ($\beta = 0.37$, $p < 0.001$) and 'formal query' for OAHs ($\beta = 0.27$, $p < 0.001$). That is, the students' high self-regulatory perceptions may determine whether they would utilize 'elaboration' as a strategy to integrate academic resources obtained from their teachers or class assistants (formal query) on the Internet. However, the students' perceived SRL did not seem to play a role in the learning process when selecting a best-fit answer (i.e., using the 'match' strategy) obtained through formal or informal online query to solve their course-related problems.

4. Implications for higher education

In addition to the supports of online environments for improving learners' help seeking behaviors proposed by previous studies (e.g., Cheng & Tsai, 2011; Mäkitalo-Siegl et al., 2011; Puustinen et al., 2011), the present study has further identified learners' SRL and ICs as personal factors in predicting their OAHs. Moreover, this study has verified that the university students' perceived SRL, in some

respects, mediates the relationships between their perceptions of ICs and OAHs. These results imply that the enhancement of university students' SRL could facilitate their utilization of sophisticated ICs when involved in OAHs.

In pedagogical practices, teachers can guide students who do not perceive any level of SRL by activating these students' prior knowledge of goal setting for learning tasks (low SRL). This may increase the students' tendency to employ advanced criteria and strategies to search for relevant Internet-based materials. To enhance university students' tendency to apply advanced strategies (i.e., 'elaboration') to examine the course-related information queried from formal channels, training in monitoring, controlling, and reflecting on their learning processes (high SRL) can be considered to be integrated into regular curricula. For example, a (online) self- and peer-assessment activity that requires students to evaluate self-work and review peer-work (including comments or scoring) may enable them to develop SRL-related skills (Yang & Tsai, 2010). Taking this a step further, a mechanism of scaffolding the SRL strategy could also be included in relevant systems (e.g., e-tutor systems) to enhance OAHs and advanced ICs.

5. Conclusion and future work

The present study identified the role of the university students' perceived SRL and ICs in their perceptions of OAHs and further testified to the mediation effects of SRL on the relationships between OAHs and ICs. These findings contribute to a better understanding of contemporary university students' online academic help seeking.

With regard to the direction of future research, an interesting finding in this study points to an area worth further exploration. According to the results of the path analysis, the university students were likely to utilize less sophisticated strategies (i.e., 'match') to adopt the information they retrieved from experts on the Internet (informal query). During the learning process, moreover, the significance of their perceptions of SRL was not apparent. As mentioned earlier, the students may view the information as an authoritative solution and consequently adopt it directly. The importance of seeking help through informal online channels has been emphasized by previous studies (e.g., Cheng & Tsai, 2011); however, there were no measurements of the students' academic achievement after they sought help online in this study. It cannot be ascertained whether the students performed better academically with less sophisticated strategies of ICs while seeking help online. Accordingly, it is suggested that measurements of learners' grades or achievement could be included in follow-up research.

Finally, studies regarding learners' OAHs and ICs have primarily used university students as their sample subjects (e.g., Cheng & Tsai, 2011; Liang & Tsai, 2009; Wu & Tsai, 2005, 2007) as opposed to sampling elementary or high school students. With the rapid development of technology in daily life, K12 school students should also be familiar with the utilization of the Internet for relevant learning activities. Thus, there is a need to probe the representations of these students' OAHs or ICs. Further understanding of these students' OAHs or ICs

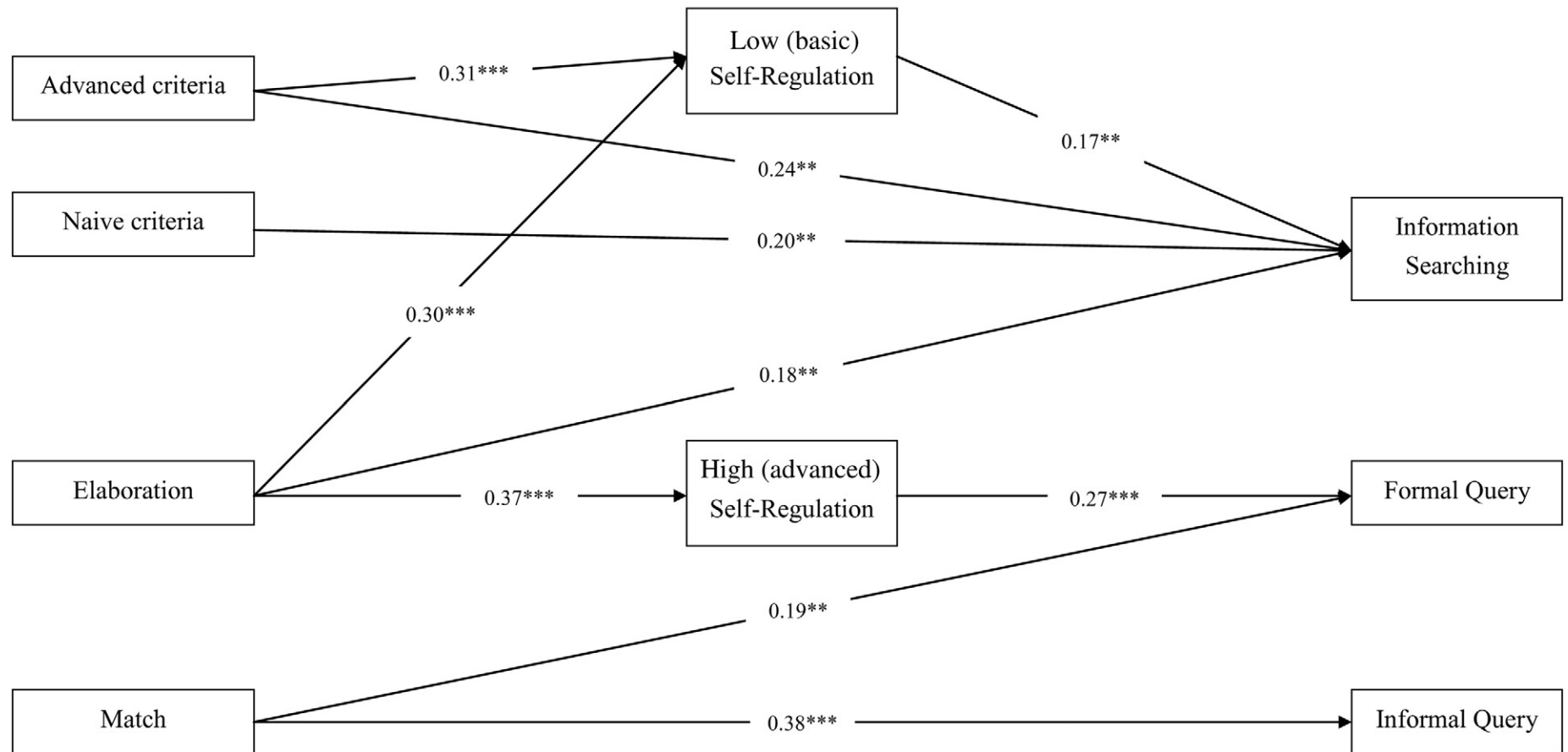


Fig. 1. Path analysis among information commitments, self-regulation, and online academic help seeking.

and the mediations of their perceived SRL may prove helpful to instructors or educators in formulating appropriate instructional strategies to improve K12 school students' learning processes or outcomes.

Acknowledgment

Funding of this research work is supported by the National Science Council, Taiwan, under grant numbers NSC 99-2511-S-011-005-MY3 and 99-2511-S-011-008-MY3.

References

- Azevedo, R. (2005). Using hypermedia as a metacognitive tool for enhancing student learning? The role of self-regulated learning. *Educational Psychologist*, 40(4), 199–209.
- Barnard, L., Paton, V., & Lan, W. (2008). Online self-regulatory learning behaviors as a mediator in the relationship between online course perceptions with achievement. *International Review of Research in Open and Distance Learning*, 9(2), 1–11.
- Chang, M. M. (2007). Enhancing web-based language learning through self-monitoring. *Journal of Computer Assisted Learning*, 23(3), 187–196.
- Cheng, K. H., & Tsai, C. C. (2011). An investigation of Taiwan University students' perceptions of online academic help seeking, and their web-based learning self-efficacy. *Internet and Higher Education*, 14(3), 150–157.
- Hodges, C. B. (2005). Self-regulation in web-based courses: A review and the need for research. *The Quarterly Review of Distance Education*, 6(4), 375–383.
- Karabenick, S. A. (1998). Help seeking as a strategic resource. In S. A. Karabenick (Ed.), *Strategic help seeking: implications for learning and teaching*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Karabenick, S. A. (2003). Seeking help in large college classes: A person-centered approach. *Contemporary Educational Psychology*, 28(1), 37–58.
- Karabenick, S. A., & Newman, R. S. (2006). *Help seeking in academic settings: Goals, groups and contexts*. Mahwah, NJ: Erlbaum.
- Lee, S. W. Y., & Tsai, C. C. (2011). Students' perception of collaboration, self-regulated learning, and information seeking in the context of Internet-based learning and traditional learning. *Computers in Human Behavior*, 27(2), 905–914.
- Liang, J. C., & Tsai, C. C. (2009). The information commitments toward web information among medical students in Taiwan. *Educational Technology and Society*, 12(1), 162–172.
- Mäkitalo-Siegl, K., & Fischer, F. (2011). Stretching the limits in help-seeking research: Theoretical, methodological, and technological advances. *Learning and Instruction*, 21(2), 243–246.
- Mäkitalo-Siegl, K., Kohnle, C., & Fischer, F. (2011). Computer-supported collaborative inquiry learning and classroom scripts: Effects on help-seeking processes and learning outcomes. *Learning and Instruction*, 21(2), 257–266.
- Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451–502). San Diego, CA: Academic Press.
- Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review*, 16(4), 385–407.
- Pintrich, P. R., & Zusho, A. (2002). The development of academic self-regulation: The role of cognitive and motivational factors. In A. Wigfield, & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 249–284). San Diego, CA: Academic Press.
- Puustinen, M., Bernicot, J., & Bert-Erboul, A. (2011). Written computer-mediated requests for help by French-speaking students: An analysis of their forms and functions. *Learning and Instruction*, 21(2), 281–289.
- Rouet, J. F. (2006). *The skills of document use: From text comprehension to Web-based learning*. Mahwah, NJ: Erlbaum.
- Ryan, A. M., Patrick, H., & Shim, S. O. (2005). Differential profiles of students identified by their teacher as having avoidant, appropriate or dependent help-seeking tendencies in the classroom. *Journal of Educational Psychology*, 97(2), 275–285.
- Ryan, A. M., & Pintrich, P. R. (1997). "Should I ask for help?" The role of motivation and attitudes in adolescents' help-seeking in math class. *Journal of Educational Psychology*, 89(2), 329–341.
- Strømso, H. I., & Bråten, I. (2010). The role of personal epistemology in the self-regulation of internet-based learning. *Metacognition and Learning*, 5(1), 91–111.
- Taiwan Network Information Center (2011). Internet broadband usage in Taiwan: A summary report (January 2011). <http://www.twnic.net.tw/download/200307/1101f.pdf> Accessed 10.24.11
- Tien, F. F., & Fu, T. T. (2008). The correlates of the digital divide and their impact on college student learning. *Computers in Education*, 50(1), 421–436.
- Tsai, C. C. (2004). Information commitments in Web-based learning environments. *Innovations in Education and Teaching International*, 41(1), 105–112.
- Vighnarajah, Wong, S. L., & Abu Bakar, K. (2009). Qualitative findings of students' perception on practice of self-regulated strategies in online community discussion. *Computers in Education*, 53(1), 94–103.
- Wu, Y. T., & Tsai, C. C. (2005). Information commitments: Evaluative standards and information searching strategies in web-based learning environments. *Journal of Computer Assisted Learning*, 21(5), 374–385.
- Wu, Y. T., & Tsai, C. C. (2007). Developing an information commitment survey for assessing students' web information searching strategies and evaluative standards for web materials. *Educational Technology and Society*, 10(2), 120–132.
- Yang, Y. F., & Tsai, C. C. (2010). Conceptions of and approaches to learning through online peer assessment. *Learning and Instruction*, 20(1), 72–83.
- Zimmerman, B. J. (2001). Theories of self-regulated learning and academic achievement: An overview and analysis. In B. J. Zimmerman, & D. E. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (pp. 1–37). Mahwah, NJ: Erlbaum.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice*, 41(2), 64–70.