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Paper Title Predicting College Students' Online Help-Seeking Behavior: The Effect of Learning Proficiency, Interest, Prior Knowledge, Epistemological Belief, and Problem Difficulty

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Session Title Exploring Ideas to Work With At-Risk Students

Session Type Roundtable Presentation

Presentation Date 4/10/2016

Presentation Location Washington, D.C.

Descriptors Achievement, Colleges, Survey Research

Methodology Quantitative

Unit SIG-Computer and Internet Application in Education

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Predicting College Students' Online Help Seeking Behavior: The Effect of Learning Proficiency, Interest, Prior Knowledge, Epistemological Belief, and Problem Difficulty

Introduction

Help seeking has been identified as a learning strategy manifesting capacities for self-regulated learning (Aleven, et al., 2003). Nevertheless, there is evidence that students often encounter barriers in help seeking in classroom settings. This may involve difficulties in identifying helpers or hesitation in approaching helpers due to anxiety or a lack of self-confidence (Ryan & Shin, 2011).

Aided by web technology, students may not need to face such barriers when seeking help. Moreover, communicating with experts online or utilizing search engines makes abundant relevant information accessible, and is arguably less intimidating than face-to-face interactions. As a result, students seeking online assistance may have fewer concerns about being labeled as incompetent (Kumrow, 2007). However, web technology also poses new challenges for help seeking. For example, given ambiguous queries, search engines are likely to return irrelevant and useless information.

Reflecting these concerns, research into facilitating students in seeking help online has become imperative. A better understanding of the factors influencing online help-seeking behaviors is indeed essential for an effective facilitation strategy. In response, this study investigated the primary factors predicting college students' online help seeking.

Literature Review

Online Help Seeking

Help seeking is a cognitive skill involving a sequence of actions, such as realizing the need of help, identifying helpers, and forming questions to solicit help (Aleven, et al., 2003). Online

help seeking refers to help seeking facilitated by online tools, such as search engine, emails or discussion boards. Cheng and Tsai (2011) identified three types of online help-seeking behaviors based on the two standards:

1. Asking teachers online for help
2. Asking peers online for help
3. Online searching

Although help seeking has been studied extensively in classroom settings, research on online help seeking is still very thin on the ground (Vighnarajah, Wong, & Abu Bakar, 2009; Cheng & Tsai, 2011). Given the potential advantages and challenges of online help seeking, there is a need for educators to understand how to help students acquire online help-seeking skills effectively. A thorough understanding of the predictors of online help seeking is essential for this purpose.

Factors Influencing Online Help Seeking

This study examined four individual factors and one contextual factor. The four individual factors are 1) epistemological belief, 2) interest, 3) learning proficiency level, and 4) prior knowledge of the subject. The contextual factor is problem difficulty.

Epistemological belief refers to individuals' beliefs about the nature of knowledge and knowing (Muis, 2007). More specifically, beliefs about knowing refer to beliefs about knowledge source and justification for knowing. This study explored whether beliefs about knowledge source predict choices about online help-seeking approaches. For example, students believing that knowledge is transmitted from external authorities may ask for help online from teachers, rather than ask their peers or search online (Strømsø & Bråten, 2010).

Interest refers to learners' interests in course topics. Students with weaker interests often have fewer incentives to learn, and consequently may prefer more certain answers from teachers (Beal, Qu, & Lee, 2008). Conversely, students with stronger interests are motivated to spend more time on learning and often achieve superior learning outcomes. As a result, they may prefer searching online to retrieve rich information (Boscolo & Mason, 2003).

Learning proficiency level refers to the general aptitude and experience of a student. Students with little experience of a field are deemed to be novice students, while students with rich experience of a field are deemed as expert students. Prior research indicates that novices are more easily deterred by complex problems, more dependent on authorities, and less effective in deciding whether to seek help (Kitsantas & Zimmerman, 2002). Experts, in contrast, have more well-developed help-seeking strategies (Wirth & Leutner, 2008) and more skill in soliciting information through online searching (Karlsson, et. al., 2012).

Prior knowledge of the learning subject reflects learners' knowledge of the teaching content of a course. Students with less prior knowledge may need more time to process information and form questions or queries (Bartholomè, et al., 2006). Search engines have limited capacity to modify and improve students' queries, so students may fail to solicit relevant information from online searching with ambiguous queries (Puustinen & Rouet, 2009).

Problem difficulty is attributed to problem scales and attainment level of knowledge (Jonassen & Hung, 2008). Bigger problem scales and higher levels of knowledge attainment are associated with more difficult problems. Students may become more dependent on information provided by experts rather than trying to find their own solutions when facing difficult problems (Li & Belkin, 2010).

Research Questions

The research questions guiding this study were:

1. How do college students seek help online?
2. Whether and to what extent can the proposed factors (epistemological belief, interest, learning proficiency level, prior knowledge of the learning subject, and problem difficulty) predict college students' three types of online help seeking (information searching, formal query, and informal query)?

Research Design

Participants of this study were two groups of 219 undergraduate students from a southeastern university in U.S. One group was identified as novice students, including 169 students new to computer science. The other group was identified as expert students, including 50 senior students majored in computer science.

A survey (Appendix A) developed by the authors was used to measure participants' online help-seeking behaviors and four proposed factors (epistemological belief, interest, prior knowledge of the learning subject, and problem difficulty). The fifth factor, learning proficiency level, identified the participant's group.

Results

How do College Students Seek Help Online?

Data from 219 students were collected and 12 of them were excluded from analysis due to missing information. Descriptive summaries of how students seek help online are presented in Table 1.

-- Insert Table 1 --

A t-test was applied to explore the difference in online help seeking between the novice and expert students. The result indicated significant differences in online searching [$t(205) = -$

4.11, $p < .01$] and asking peers online for help [$t(205) = -2.42$, $p < .05$]. No significant difference was found in asking teachers online for help.

Permutation tests were used to examine the differences among three online help-seeking behaviors. The result showed that students searched online [Mean (total) = 3.00] more frequently than asked peers online for help [Mean (total) = 2.60] ($p < .01$), and asked peers online for help more frequently than asked teachers online for help [Mean (total) = 2.07] ($p < .01$).

To What Extent Can the Proposed Factors Predict College Students' Three Types of Online Help Seeking?

Factor Analysis of Survey on Online Help Seeking

An exploratory factor analysis was conducted on the 10 survey questions measuring the proposed four factors with oblique rotation (varimax). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis as .61. The overall reliability is .62. Four factors with eigenvalues over Kaiser's criterion 1 emerged, and explained 52.56% of the total variance (Table 2).

-- Insert Table 2 --

Multiple Regression on Online Help Seeking

Multiple regression was conducted to explore the predictive power of the proposed factors. Factor scores generated in explorative factor analysis were used as independent variables. Three prediction models were constructed. Multicollinearity diagnostics were conducted on each model. The Variance Inflation Factor of all the predictors was smaller than 2.5 in each model.

In the model of online searching (Table 3), 26.9% of variances ($R^2 = .269$, $p < .00$) of the dependent variable were accounted for. Learning proficiency level ($t = 3.97$, $p < .00$),

epistemological belief ($t = 5.93, p < .00$) and problem difficulty ($t = 3.84, p < .00$) were significant predictors.

-- Insert Table 3 --

In the model of asking teachers online for help (Table 4), 6.3% of variances ($R^2 = .063, p < .05$) of the dependent variable were accounted for. The only significant predictor was problem difficulty ($t = 2.64, p < .05$).

-- Insert Table 4 --

In the model of asking peers online for help (Table 5), 21.9% of variances ($R^2 = .219, p < .00$) of the dependent variables were accounted for. Interest ($t = -3.99, p < .00$), problem difficulty ($t = 5.28, p < .00$) and learning proficiency level ($t = 1.86, p < .05$) were significant predictors.

-- Insert Table 5 --

Discussion

How do College Students Seek Help Online?

The results of this study indicated that college students preferred to search online more than asking people for help online. This finding supports the claims of Puustinen and Rouet (2009) that online searching should be considered as an integrated part of online help seeking.

To What Extent Can the Proposed Factors Predict College Students' Three Types of Online Help Seeking?

The proposed factors in this study have strong predictive power on online searching and asking peers online for help, but relatively weak predictive power on asking teachers online for help. This finding indicated that online searching and asking peers online for help shared some similarities, but they differed considerably from asking teachers online for help.

Problem difficulty was a significant predictor for all three types of online help seeking. In general, students tended to seek help online more frequently as problem difficulty increases, but also become more dependent on asking help from people rather than searching online themselves. However, in contrast to prior research (Li & Belkin, 2010), participants of this study did not show dependence on authorities.

Learning proficiency level was the other significant predictor for all three types of online help seeking. Experts tended to use all different types of online help seeking approaches, especially online searching, more frequently. The key reason why some learners failed to take advantage of online help seeking might be rooted in differences in the problem solving process between novice and expert students.

Epistemological belief was found one of the most powerful predictors for online searching. This signifies that acceptance of independent learning as a knowledge source is important for enabling students to take advantage of online searching in problem solving. Interest was found a significant predictor for asking peers online for help. Surprisingly, interest was negatively related to asking peers online for help. One possibility is that asking people for help was comparatively easier than online searching when it came to a learning problem, and students' weak interests in the course may lead them to avoid teachers.

Conclusions

The findings demonstrate that online searching should be considered as an integrated part of online help seeking. In particular, the research found that students with higher learning proficiency or better academic performance were more inclined to search online and ask peers online for help.

The five proposed factors, including epistemological belief, interest, learning proficiency level, prior knowledge of the learning subject, and problem difficulty, each influenced online help seeking to various extents. The implications of these findings can be used as guidance for the design and implementation of strategies to facilitate online help seeking among students.

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Appendix A

Survey: What factors influencing online help seeking

Section 1

1. When you find difficulties in solving problems (e.g., algorithmic problems - find the mode from an array of integers) in assignments, how often do you search online to learn about it?

A. never B. occasionally C. sometimes D. always

2. When you find difficulties in solving problems (e.g., algorithmic problems - find the mode from an array of integers) in assignments, how often do you email the teacher or teaching assistant for help?

A. never B. occasionally C. sometimes D. always

3. When you find difficulties in solving problems (e.g., algorithmic problems - find the mode from an array of integers) in assignments, how often do you ask your peers or some unknown experts online for help?

A. never B. occasionally C. sometimes D. always

Section 2

1. I am interested in the learning content of the class.

A. strongly disagree B. disagree C. agree D. strongly agree

2. I would like to master the learning content of the course I am taking.

A. strongly disagree B. disagree C. agree D. strongly agree

3. I would still like to take the course if it is elective.

A. strongly disagree B. disagree C. agree D. strongly agree

4. I have prior knowledge of the learning content of the course.

A. strongly disagree B. disagree C. agree D. strongly agree

5. I have related learning experience before taking the course.

A. strongly disagree B. disagree C. agree D. strongly agree

6. I will become more willingly to seek help from others online if the learning task I have problems with is very complex.

A. strongly disagree B. disagree C. agree D. strongly agree

7. I will become less willingly to search online if the learning task I have problems with is very complex.

A. strongly disagree B. disagree C. agree D. strongly agree

8. I believe that one can master knowledge and skills of certain subjects (e.g., coding) by learning independently with the open online resources and search engines.

A. strongly disagree B. disagree C. agree D. strongly agree

9. I think self-paced learning with search engines, online open resources, and helps from others online is a very important way to learn.

A. strongly disagree B. disagree C. agree D. strongly agree

10. I think learning with an expert (physically present) through lecture or class is the best way to learn.

A. strongly disagree B. disagree C. agree D. strongly agree

Tables

Table 1. Descriptive analysis of online help seeking.

	Novice students		Expert students		Total	
	Mean	SD	Mean	SD	Mean	SD
Online searching	2.88	0.82	3.46	0.78	3.00	0.84
Asking teachers online for help	2.02	0.80	2.29	0.81	2.07	0.81
Asking peers online for help	2.53	0.91	2.90	0.77	2.60	0.89

Table 2. Exploratory factor analysis on 10 questions on online help seeking.

Item	Interest	Prior Knowledge	Epistemological belief	Problem difficulty
1. LearnLike	.83			
2. LearnWill	.76			
3. CourseWill	.66			
4. PriorKnow		.99		
5. PriorExp		.66		
6. DifIncAsk				.85
7. DifIncSearch				.46
8. SelfLearnPerc			.52	
9. SelfLearnLike			.82	
10. ClassLearnDis			.26	
Reliability Coefficient (α)	.78	.79	.56	.61

Overall $\alpha = .62$, total variance explained = 56.25%.

LearnLike Interests in course content, *LearnWill* Willingness to master course content, *CourseWill* Willingness to take such an elective course, *PriorKnow* Prior knowledge, *PriorExp* Prior learning experience, *DifIncAsk* Willingness to ask for help online when difficulty increases, *DifIncSearch* Willingness to search online when difficulty increases, *SelfLearnPerc* Perception of self-learning, *SelfLearnLike* Preference of self-learning, *ClassLearnDis* Dislike of classroom learning.

Table 3. Multiple regression analysis on online searching.

	R ²	R ² _{adj}	ΔF	β	t
Online searching	.269	.251	14.82		
Learning proficiency level				.25***	3.97
Interest				-.04	-0.70
Prior knowledge of the learning subject				-.01	-0.10
Epistemological belief				.36***	5.93
Problem difficulty				.23***	3.84

* $p < .05$; ** $p < 0.01$; *** $p < .001$

Table 4. Multiple regression analysis on asking teachers online for help.

	R ²	R ² _{adj}	ΔF	β	t
Asking teachers for help online	.063	.04	2.72		
Learning proficiency level				.13	1.91
Interest				-.01	-0.15
Prior knowledge of the learning subject				.06	0.87
Epistemological belief				-.10	-1.52
Problem difficulty				.18*	2.64

* $p < .05$; ** $p < 0.01$; *** $p < .001$

Table 5. Multiple regression analysis on asking peers online for help.

	R ²	R ² _{adj}	ΔF	β	t
Asking peers online for help	.219	.20	11.30		
Learning proficiency level				.12*	1.86
Interest				-.25***	-3.99
Prior knowledge of the learning subject				.09	1.38
Epistemological belief				.10	1.56
Problem difficulty				.33***	5.28

* $p < .05$; ** $p < 0.01$; *** $p < .001$