British Journal of Educational Technology *Vol 48 No 6 2017* 1273–1283
doi:10.1111/bjet.12499

The influence of achievement goals on online help seeking of computer science students

Qiang Hao, Brad Barnes, Ewan Wright and Robert Maribe Branch

Qiang Hao is engaged in doctoral research in both Learning, Design and Technology and Computer Science at The University of Georgia. His current research focuses include computer science education, self-regulated learning and educational data mining. Brad Barnes is the undergraduate coordinator of Computer Science at the University of Georgia. His research focuses include parallel and distributed computing, computer architecture, operating systems and computer science education. Ewan Wright is engaged in doctoral research in the Faculty of Education at The University of Hong Kong, where he holds the Hong Kong Postgraduate Fellowship. His research interests are based around the massification of higher education, inequalities within higher education, and transitions from higher education to employment. Dr. Robert Maribe Branch is a Professor of Learning, Design, and Technology at the University of Georgia, and a Past President of the Association for Educational Communications and Technology. He authored the book Instructional Design: The ADDIE Approach, Survey of Instructional Development Models. His research focuses on visualizing complex conceptual relationships. Address for correspondence: Qiang Hao, Learning, Design and Technology & Computer Science, University of Georgia, River's Crossing Campus, 850 College Station Road, Athens, GA, USA. Email: neohao@uga.edu

Abstract

This study investigated the online help-seeking behaviors of computer science students with a focus on the effect of achievement goals. The online help-seeking behaviors investigated were online searching, asking teachers online for help, and asking peers or unknown people online for help. One hundred and sixty-five students studying computer science from a large research university in the south-eastern United States participated in the study. It was found that students searched online significantly more frequently than they asked people online for help. Contrary to prior findings on face-to-face help seeking, no achievement goals were found to be significant in predicting the tendencies of students to seek help online. These findings provide evidence to support the role of online searching as an integral part of online help seeking and demonstrate that research findings on face-to-face help seeking should not be assumed to be naturally extendable to online help seeking.

Introduction

Higher education enrollments have grown substantially in the United States over the last decade. The enrollment of students aged under 25 has increased by more than 35%from 2000 to 2012, and is expected to further increase 12% by 2023 (U.S. Department of Education, 2015). Such an expansion has put stress on the infrastructure of higher education in terms of funding, resources, and support provided on a per-student basis. Potentially offering a solution to some of these concerns, there have been calls for new forms of learning and teaching in higher education which rely heavily on Internet Technology (Yang & Cao, 2013).

In the context of such changes to teaching and learning in higher education, college students have to increasingly self-regulate their learning in either large classroom or online learning environments, especially given the growing ratio of students to teachers (Newman, 2008). As a result, being able to seek help online is becoming increasingly important for effective self-

Practitioner Notes

What is already known about this topic

- Seeking social assistance from people is traditionally understood as the only form of help-seeking behavior.
- Achievement goals are strongly correlated to face-to-face help seeking in classroom environments.
- Achievement goals are significant predictors of face-to-face help seeking in classroom environments.

What was unknown

- Whether information seeking from machines, such as search engines, should be considered as a help-seeking behavior.
- Whether the findings from research on achievement goals and face-to-face help seeking can be extended to online help seeking.
- If the findings from research on achievement goals and face-to-face help seeking cannot be extended to online help seeking, what would be their relationship in such a context?

What this paper adds

- Online searching, namely information seeking from search engines, should be considered as an integral part of online help seeking.
- Achievement goals have limited correlation with online help seeking.
- None of the achievement goals are significant predictors of online help seeking.

Implications for practice and/or policy

- Helping students search online effectively for help-seeking purposes should be considered equally or more important to helping students ask people online for help.
- Encouraging students to seek help online for learning problems is becoming increasingly urgent. Achievement goals may not be the correct starting point to approach this problem.
- Findings from research on achievement goals and face-to-face help seeking cannot be assumed naturally extendable to online help seeking. More studies are necessary to examine whether other findings on face-to-face help seeking are extendable to online help seeking.

regulated learning in such environments (McInnerney & Roberts, 2004; Rakes & Dunn, 2010). Moreover, online help seeking has a range of particular advantages compared with face-to-face help seeking, such as immediate answers, limited self-esteem threats, and the potential of reaching larger professional communities (Kozanitis, Desbiens, & Chouinard, 2007; Ryan & Shin, 2011). It is, therefore, crucial for educators and researchers to better understand how to facilitate online help seeking among students, which necessitates the exploration of the potential factors influencing online help seeking.

This study aimed to explore how college students majoring in computer science seek help online and the effect of achievement goals on their online help-seeking behavior. Although prior studies have established a strong link between achievement goals and face-to-face help seeking in classroom contexts (eg, Butler & Neuman, 1995; Cheong, Pajares, & Oberman,

*Figure 1: 2*2 achievement goal framework*

2004; Roussel, Elliot, & Feltman, 2011), research on the relationship between achievement goals and online help seeking is still lacking. Consequently, there is a gap in the existing literature examining whether findings in classroom contexts can be extended to online contexts.

Literature review

Online help seeking

As a cognitive skill that manifests self-regulated learning, help seeking involves a set of actions, such as being aware of the need for help, identifying problems and potential helpers, and forming questions to solicit help (Aleven, McLaren, Roll, & Koedinger, 2006; Karabenick, 2003; Newman, 2008). Online help seeking, as a subcategory of help seeking, refers to help seeking that is aided by online tools, such as emails or question & answer forums.

Seeking social assistance from other people was traditionally understood as the only form of help-seeking behavior (Ryan, & Pintrich, 1997; Zimmerman & Pons, 1986). As a result, information seeking, such as online searching, was not classified as a type of help seeking. Nevertheless, the boundary between seeking information and social assistance has been blurred with the development of Internet technology. Interaction with machines, such as search engines, for help-seeking purposes has become ubiquitous in teaching and learning. Although Puustinen and Rouet (2009) and Cheng and Tsai (2011) suggested that online searching should be classified as a type of online help seeking, evidence supporting such a claim is still lacking.

Achievement goals

Achievement goals refer to goals or aims set by students, which guide their competence-relevant behaviors (Hao, Branch, & Jensen, 2016; Karabenick, 2004; Roussel *et al.*, 2011). The features of competence and valence have been highlighted as significant in distinguishing achievement goals (Elliot & McGregor, 2001; Yang & Cao, 2013). On the one hand, competence distinguishes mastery-goals from performance-goals. Mastery-goals guide learners to emphasize the mastery of learning content, while performance-goals orient learners to focus on self-competence relative to others (Dweck, 1986; Elliot & Church, 1997). On the other hand, valence differentiates achievement goals from the aspect of approach and avoidance. Learners with approach-goals focus more on achieving positive results, such as good academic performance, whereas learners with avoidance-goals usually try to avoid negative results (Cury, Elliot, Da Fonseca, & Moller, 2006; Huet, Escribe, Dupeyrat, & Sakdavong, 2011). The features of competence and valence classify achievement goals into four categories: mastery-approach, performance-approach, mastery-avoidance and performance-avoidance goals (see Figure 1). This classification is also referred as 2*2 achievement goal framework (Elliot & McGregor, 2001; Huet *et al.*, 2011).

The relationship between achievement goals and help seeking has been studied extensively in classroom learning contexts (eg, Butler & Neuman, 1995; Cheong *et al.*, 2004; Huet *et al.*, 2011; Roussel *et al.*, 2011; Skaalvik & Skaalvik, 2005; Yang, & Cao, 2013). It was found that students with higher mastery-approach goals tend to seek help most frequently in mathematics, computer science, and experimental problem-solving environments (eg, Butler & Neuman, 1995; Cheong *et al.*, 2004; Skaalvik & Skaalvik, 2005). Conversely, students with higher performance-avoidance goals were found more likely to actively avoid help seeking (eg, Roussel *et al.*, 2011; Skaalvik & Skaalvik, 2005). However, contradictory results were found regarding the effect of other two types of achievement goals on students' tendency of help seeking. For example, Ryan and Pintrich (1997) found that performance-approach and mastery-avoidance goals were negatively related to students' tendency of help seeking, while Tanaka, Murakami, Okuno, and Yamauchi (2001) found the opposite results. Cheong and his colleagues (2004) also found that performance-approach goals were unrelated to students' tendency of help seeking.

There remains a lack of research testing the relationship between achievement goals and help seeking in *online* contexts. This is a notable omission given that online help seeking is intrinsically different from face-to-face help seeking in classroom contexts. First, many factors key to face-to-face help seeking are less important for online help seeking, such as the ability to identify potential helpers and self-esteem threats (Karabenick, 2003; Kumrow, 2007). Second, new and significant challenges are posed by online help seeking. Search engines are more limited in adapting to students' questions than human helpers, so students who have difficulties in devising accurate queries may fail to solicit relevant information from search engines (Tabatabai & Shore, 2005). In addition, asynchronous communication on question & answer forums with other online users can be prone to misunderstandings and thus may not yield the desired information (Rovai & Jordan, 2004). Reflecting on these issues, more studies are needed to explore whether prior research findings in classroom contexts can be extended to online contexts.

Research questions

The research questions that guided this study were:

1. How do computer science students seek help online?
2. How do achievement goals influence computer science students' online help-seeking tendency in terms of online searching, asking teachers online for help, and asking peers or unknown people online for help?

Research design

Participants

Data were collected from four different computer science courses in a large research university in the south-eastern United States. One hundred and sixty-five undergraduate students agreed to participate in this study. Participants were predominantly male (88.5%) and lower-level undergraduates (84.8%). All four courses implemented Piazza (https://piazza.com/) for students to ask questions to other peers, teachers, or teaching assistants. Teachers and teaching assistants were also accessible to answer questions through email. Each course evaluates students by their performances on (1) Individual tasks, (2) Individual projects, (3) Group projects and (4) midterm and final exams.

Instrument

A survey was used to measure participants' achievement goals and the frequency of online help seeking. The survey was distributed to all participants and it was required that all questions were answered. The survey is composed of two parts: Achievement Goal Questionnaire-Revised (AGQ-R) and Online-Help-Seeking Measures (see Appendix). The AGQ-R developed by Elliot and

Table 1: Descriptive analysis of online help seeking

	Lower-level undergraduates		*Higher-level undergraduates*		*Total*	
	Mean	SD	Mean	SD	Mean	SD
Online searching	3.36	0.71	3.56	0.57	3.39	0.69
Asking teachers online for help	2.16	0.88	2.44	0.87	2.20	0.88
Asking peers or unknown experts online for help	2.84	0.95	2.72	1.02	2.82	0.96

Murayama (2008) measures four aspects of achievement goals, including mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goal commitment. Online Help-Seeking Measures developed by Hao, Wright, Barnes, & Branch (2016) included three questions measuring online help seeking. Based on the studies of Puustinen and Rouet (2009) and Cheng and Tsai (2011), three aspects of online help seeking were measured, including searching, asking teachers and asking peers or unknown experts online for help. A four-point Likert scale was used for all survey questions.

Data analysis

Descriptive data analysis and permutation tests were applied to answer the first research question "*How do computer science students seek help online?*." Confirmatory Factor Analysis (CFA) was conducted to validate the measurements of the survey, and covariance-based Structural Equation Modeling (SEM) was further applied to answer the second question "*How do achievement goals influence computer science students' online help-seeking tendency in terms of online searching, asking teachers online for help, and asking peers or unknown people online for help?*."

Results

Online help seeking of computer science students

Data from all 165 participants were collected. Table 1 presents the descriptive summaries of students' online-help seeking behaviors. Permutation tests were used to examine differences among three online help seeking behaviors of all students. The result indicated that the students searched online [Mean (total) = 3.39] more frequently than they asked peers or unknown experts online for help [Mean (total) = 2.82] (Difference between Means = 0.57, $p < 0.01$). In addition, the students asked peers or unknown experts online for help significantly more frequently than they asked teachers for help online [Mean (total) = 2.20] (Difference between Means = .62, $p < 0.01$).

Influence of achievement goals on online help seeking

CFA was applied to the twelve items of achievement goals, using maximum likelihood estimations on the covariance matrix. Four indexes were used to evaluate the model fit to the data, including chi-square degree of freedom ratio (χ^2/df), comparative fit index (CFI), incremental fit index (IFI), and root-mean-square error of approximation (RMSEA). The results of the four indexes (χ^2/df = 1.68, CFI = 0.95, IFI = 0.95, RMSEA = 0.06) indicated that the model fit was acceptable. Cronbach's alpha of the four achievement goal factors and correlational coefficients of all variables are presented in Table 2. A Cronbach alpha coefficient as low as 0.55 can be deemed as accepted for social science research (Hatcher & Stepanski, 1994). Therefore, the measurement of achievement goals in this study is deemed to be sufficiently reliable.

Table 2: Cronbach's a and Correlational Coefficients of main variables (N = 165)

	Cronbach's a	*1*	*2*	*3*	*4*	*5*	*6*
Online Search							
Online Teacher		−0.04					
Online Peer		0.217**	0.282**				
PAP	0.87	−0.08	0.01	0.07			
PAV	0.54	0.10	0.173*	0.262**	0.302**		
MAV	0.80	0.13	0.15	0.213**	0.00	0.804**	
MAP	0.67	−0.10	−0.03	−0.01	0.305**	0.13	0.08

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

OnlineSearch, online searching for help seeking; OnlineTeacher, asking teachers online for help; OnlinePeer, asking peers or unknown people online for help; PAP, performance-approach goals; PAV, performance-avoidance goals; MAV, mastery-avoidance goals; MAP, mastery-approach goals.

Correlational analysis showed that there were positive associations between performance-avoidance goals and asking teachers online for help ($r = 0.17$, $p < 0.05$), performance-avoidance goals and asking peers online or unknown experts for help ($r = 0.26$, $p < 0.01$), and mastery-avoidance goals and asking teachers online for help ($r < 0.21$, $p < 0.01$). However, all the significant correlation coefficients were below 0.30, which indicated little or no correlation between the associated variables (Calkins, 2005).

Covariance-based SEM was applied to further explore the relationship between the four types of achievement goals and the three types of online help seeking. The hypothesized model of achievement goals on online help seeking is presented in Figure 2. The testing results ($\chi^2/df = 0.76$, CFI = 1.00, IFI = 1.00, RMSEA = 0.00) indicated a high model fit of the hypothesized model to the data.

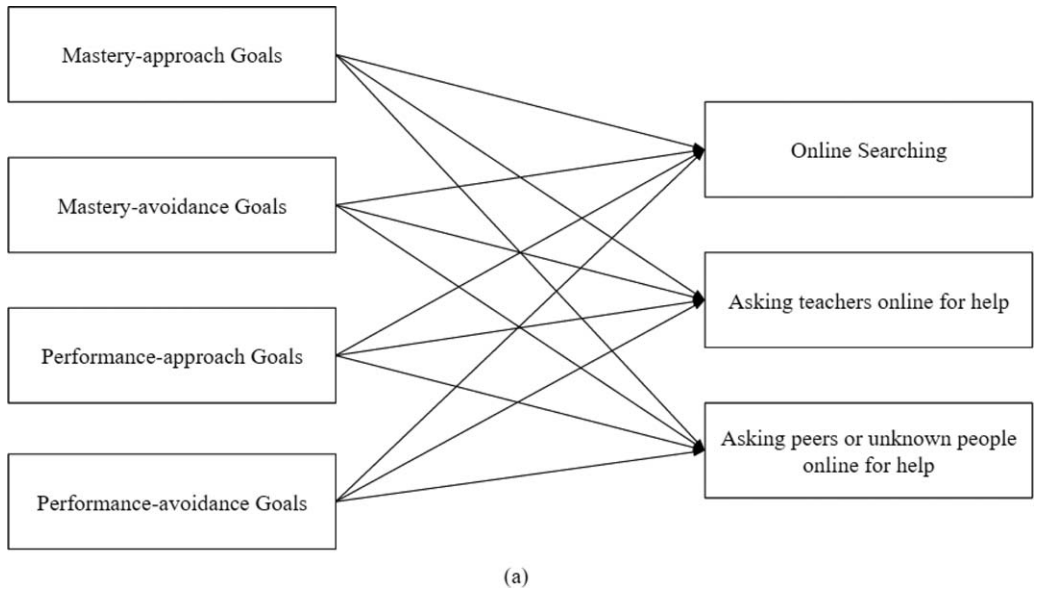

Figure 2: Proposed model of achievement goals on online help seeking

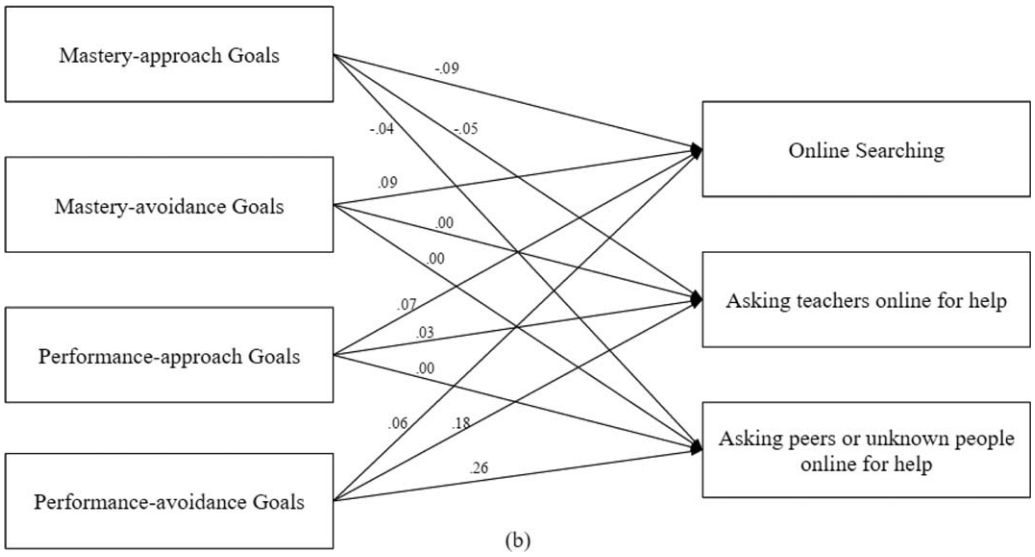

Figure 3: Standardized coefficients of achievement goals on online help seeking from the regression analysis

Contrary to the findings of previous studies (eg, Cheong *et al.*, 2004; Roussel *et al.*, 2011; Yang, & Cao, 2013), no factors of achievement goals were found to be significant in predicting any type of online help seeking (see Figure 3). The four factors, including mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance goals, explained 5.00% variance ($R^2 = 0.07$, $R^2_{adj} = 0.05$, $p < 0.05$) of asking peers or unknown experts online for help in total, but were not found to be significant in predicting online searching ($R^2 = 0.03$, $R^2_{adj} = 0.01$, $p > 0.05$) or asking teachers online for help ($R^2 = 0.03$, $R^2_{adj} = 0.01$, $p > 0.05$).

Discussion

Online help seeking of computer science students

A core finding of this study was that computer science students searched online for help-seeking purposes significantly more frequently than they asked teachers, peers or unknown experts online. This finding contributes to the existing research literature on help seeking by (1) demonstrating that online searching plays a major role in computer science students' online help seeking and (2) providing direct evidence supporting the notion that online searching should be considered as a type of help-seeking behaviors (Puustinen & Rouet, 2009).

Online searching was traditionally understood as a topic that should be addressed by other academic fields, such as information search (Zimmerman & Pons, 1986). Yet, the findings of this study demonstrate that the boundary between seeking social assistance and information searching has become blurred for computer science students, which calls for more research from educational perspectives on online searching in learning and teaching of more fields.

Influence of achievement goals on online help seeking

The need to encourage students to seek help online for learning problems is becoming increasingly urgent as student-to-teacher ratios and online-course enrollment rates continue to escalate (Allen & Seaman, 2013; Yang & Cao, 2013). Notably, the findings of this study indicate that achievement goals may not be the correct starting point to approach this problem, at least not for computer science students, although the connection between achievement goals and face-to-face help seeking is well established.

In contrast to the findings of most studies on face-to-face help seeking (eg, Cheong *et al.*, 2004; Roussel *et al.*, 2011; Skaalvik & Skaalvik, 2005), this study found limited correlation between achievement goals and online help seeking. None of the four types of achievement goals were found to be significant in predicting any online help-seeking behaviors of computer science students. A possible explanation is that there are significantly fewer barriers for students to seek help online than to seek face-to-face help, so motivation plays a less important role in online help seeking. The results of this study also indicated that findings on face-to-face help seeking should not be assumed naturally extendable to help seeking in online environments (Aleven, Stahl, Schworm, Fischer, & Wallace,, 2003; Puustinen & Rouet, 2009). Therefore, future studies may need to consider a careful examination of the effect of predictors deemed as important to face-to-face help seeking on online help seeking. Furthermore, to better answer questions about how to encourage students to effectively seek help online, more explorative research on online help seeking is essential.

Limitations

The present study is not without limitations. First, all participants of this study were studying computer science at one university. Whether the findings of this study can be generalized to a larger population, such as college students across a wider range of disciplines, needs further examination. Indeed, given their field of study one could presume that computer science students would be especially inclined to seek help online compared to other students. Second, this study focused exclusively on students' tendency to seek help online. Future research may consider studying the differences between instrumental and executive online help-seeking behaviors, which will serve as guidance for the effective facilitation of online-help seeking (Cheong *et al.*, 2004; Huet *et al.*, 2011). Thirdly, a survey was the only tool used in this study to explore students' online help-seeking behaviors, which might not accurately represent how students seek help online in authentic environments. Future studies may consider using other research tools to measure students' online help seeking, such as online interaction tracking or tracing. Additionally, the survey used in this study adopted Four-Pointer Likert Scale, which helps avoiding satisficing, but may lower the reliability of the survey results. Future studies may consider modified replications using Five-Point Likert Scale in their surveys.

Conclusion

Online help seeking is becoming an increasingly important help-seeking approach for college students to succeed in their academic studies. This research adds to the emerging literature on online help seeking by (1) providing direct evidence to support the role of online searching as an integral part of online help seeking and (2) demonstrating that findings on the relationship between achievement goals and face-to-face help seeking may not be extendable to online help seeking. To build on the findings of this study, we call for research to further investigate the potential predictors of online help seeking.

Statements on open data, ethics and conflict of interest

The survey in this study was conducted from April to May in 2015. The survey data can be accessed at http://bit.ly/1MRKTxS.

This study follows ethical guidelines of Institutional Review Board of the University of Georgia, and was approved by Institutional Review Board of the University of Georgia. The participants of this study were anonymized. Participants' names have been replaced with numbers that cannot identify them individually, and their names have been deleted permanently.

There were no anticipated conflicts of interests in this study.

References

Aleven, V., Mclaren, B., Roll, I., & Koedinger, K. (2006). Toward meta-cognitive tutoring: a model of help seeking with a cognitive Tutor. *International Journal of Artificial Intelligence in Education*, *16*, 101–128.

Aleven, V., Stahl, E., Schworm, S., Fischer, F., & Wallace, R. (2003). Help seeking and help design in interactive learning Environments. *Review of Educational Research*, *73*, 277–320.

Butler, R., & Neuman, O. (1995). Effects of task and ego achievement goals on help-seeking behaviors and attitudes. *Journal of Educational Psychology*, *87*, 261–271.

Calkins, K. G. (2005). *An introduction to statistics: correlation coefficients*. Retrieved October 23, 2015, from http://www.andrews.edu/~calkins/math/edrm611/edrm05.htm.

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. *The Internet and Higher Education*, *14*, 150–157.

Cheong, Y. F., Pajares, F., & Oberman, P. S. (2004). Motivation and academic help-seeking in high school computer science. *Computer Science Education*, *14*, 3–19.

Cury, F., Elliot, A. J., Da Fonseca, D., & Moller, A. C. (2006). The social-cognitive model of achievement motivation and the 2× 2 achievement goal framework. *Journal of Personality and Social Psychology*, *90*, 666–679.

Dweck, C. S. (1986). Motivational processes affecting learning. *American psychologist*, *41*, 1040–1048.

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social psychology*, *72*, 218–232.

Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social psychology*, *80*, 501–519.

Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: critique, illustration, and application. *Journal of Educational Psychology*, *100*, 613–628.

Hao, Q., Branch, R. M., & Jensen, L. (2016). The effect of precommitment on student achievement within a Technology-rich Project-based learning Environment. *TechTrends*. doi:10.1007/s11528-016-0093-9.

Hao, Q., Wright, E., Barnes, B., & Branch, R. M. (2016). What are the most important prediction of computer science students' online help-seeking behaviors? *Computers in Human Behavior*, *62*, 467–474.

Hatcher, L., & Stepanski, E. J. (1994). *A step-by-step approach to using the SAS system for univariate and multivariate statistics*. Cary, NC: SAS Institute.

Huet, N., Escribe, C., Dupeyrat, C., & Sakdavong, J. C. (2011). The influence of achievement goals and perceptions of online help on its actual use in an interactive learning environment. *Computers in Human Behavior*, *27*, 413–420.

Karabenick, S. A. (2003). Seeking help in large college classes: a person-centered approach. *Contemporary Educational Psychology*, *28*, 37–58.

Karabenick, S. A. (2004). Perceived achievement goal structure and college student help seeking. *Journal of Educational psychology*, *96*, 569–581.

Kozanitis, A., Desbiens, J. F., & Chouinard, R. (2007). Perception of teacher support and reaction toward questioning: its relation to instrumental help-seeking and motivation to learn. *International Journal of Teaching and Learning in Higher Education*, *19*, 238–250.

Kumrow, D. E. (2007). Evidence-based strategies of graduate students to achieve success in a hybrid Web-based course. *The Journal of Nursing Education*, *46*, 140–145.

U.S. Department of Education (2015). National Center for Education Statistics: Digest of Education Statistics, 2013 (NCES 2015-011). Retrieved October 18, 2015, from http://nces.ed.gov/fastfacts/display.asp?id=98

McInnerney, J. M., & Roberts, T. S. (2004). Online learning: social interaction and the creation of a sense of community. *Journal of Educational Technology & Society*, *7*, 73–81.

Newman, R. S. (2008). The motivational role of adaptive help seeking in self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: theory, research, and applications* (pp. 315–337). Mahwah, NJ: Erlbaum.

Puustinen, M., & Rouet, J. F. (2009). Learning with new technologies: help seeking and information searching revisited. *Computers & Education*, *53*, 1014–1019.

Rakes, G. C., & Dunn, K. E. (2010). The impact of online graduate students' motivation and self-regulation on academic procrastination. *Journal of Interactive Online Learning*, *9*, 78–93.
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*, 329–341.
Ryan, A. M., & Shin, H. (2011). Help-seeking tendencies during early adolescence: an examination of motivational correlates and consequences for achievement. *Learning and Instruction*, *21*, 247–256.
Roussel, P., Elliot, A. J. & Feltman, R. (2011). The influence of achievement goals and social goals on help-seeking from peers in an academic context. *Learning and Instruction*, *21*, 394–402.
Rovai, A. P., & Jordan, H. (2004). Blended learning and sense of community: a comparative analysis with traditional and fully online graduate courses. *The International Review of Research in Open and Distributed Learning*, 5, Retrieved August 15, 2016, from http://www.irrodl.org/index.php/irrodl/article/view/192/795
Skaalvik, S., & Skaalvik, E. M. (2005). Self-concept, motivational orientation, and help-seeking behavior in mathematics: a study of adults returning to high school. *Social Psychology of Education*, *8*, 285–302.
Tabatabai, D., & Shore, B. M. (2005). How experts and novices search the Web. *Library & Information Science research*, *27*, 222–248.
Tanaka, A., Murakami, Y., Okuno, T., & Yamauchi, H. (2001). Achievement goals, attitudes toward help seeking, and help-seeking behavior in the classroom. *Learning and Individual Differences*, *13*, 23–35.
Yang, Y., & Cao, L. (2013). Differential influences of achievement approach goals and intrinsic/extrinsic motivation on help-seeking in e-learning. *Knowledge Management & E-Learning: An International Journal (KM&EL)*, 5, 153–169.
Zimmerman, B. J., & Pons, M. M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal*, *23*, 614–628.

Appendix

Survey: the influence of achievement goals on online help seeking

Section 1: Online help-seeking measures (Hao, Wright, Barnes, & Branch, 2016)

1. When you find difficulties in solving problems (eg, 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. Seldom C. Sometimes D. Often

2. When you find difficulties in solving problems (eg, 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. Seldom C. Sometimes D. Often

3. When you find difficulties in solving problems (eg, 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. Seldom C. Sometimes D. Often

Section 2: Achievement goal questionnaire-revised (Elliot & Murayama, 2008)

Mastery-Approach Goal Items

1. My aim is completely master the material presented in this class.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

7. I am striving to do well compared to other students.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

3. My goal is to learn as much as possible.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

Mastery-Avoidance Goal Items

5. My aim is to perform well relative to other students.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

11. My aim is to avoid learning less than I possibly could.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

9. My goal is to avoid performing poorly compared to others.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

Performance-Approach Goal Items

4. I am striving to understand the content as thoroughly as possible.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

2. My goal is to perform better than the other students.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

8. My goal is to avoid learning less than it is possible to learn.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

Performance-Avoidance Goal Items

12. I am striving to avoid performing worse than others.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

6. My aim is to avoid doing worse than other students.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree

10. I am striving to avoid an incomplete understanding of the course material.

A. Strongly disagree B. Disagree C. Agree D. Strongly agree