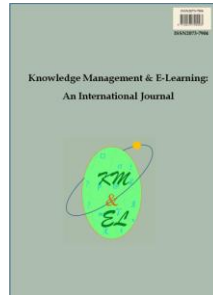


*Knowledge Management & E-Learning, Vol.5, No.2. Jun 2013*

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# Knowledge Management & E-Learning

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ISSN 2073-7904

## **Differential influences of achievement approach goals and intrinsic/extrinsic motivation on help-seeking in e-learning**

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### **Recommended citation:**

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*, 5(2), 153–196.

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## **Differential influences of achievement approach goals and intrinsic/extrinsic motivation on help-seeking in e-learning**

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**Abstract:** Considering the importance yet paucity of help-seeking in e-learning, the present study investigated the motivational antecedents of help-seeking among online college students. We explored and compared the influences of achievement approach goals from the old and new achievement motivation models (Elliot & McGregor, 2001; Elliot, Murayama, & Pekrun, 2011) on online students' help-seeking through intrinsic/extrinsic motivation. Path analyses were used to test two models of help-seeking among college students from four online educational psychology classes ( $N = 93$ ) based on the two models of achievement goals. Our results showed that the new  $3 \times 2$  model was a better fit than the old  $2 \times 2$  model, suggesting that the achievement approach goals of the new model differ from those of the old model conceptually as Elliot, Murayama, and Pekrun (2011) posited. Second, our results revealed both unexpected direct and indirect positive influence of performance- and other-approach goals on online students' help-seeking behaviour through extrinsic motivation. Third, while mastery-approach goals indirectly predicted help-seeking through intrinsic motivation, self- and task-approach predicted help-seeking in a dramatically different manner. Self-approach goals displayed indirect influence on help-seeking through intrinsic motivation similar to mastery-approach, yet task-approach displayed a negative direct influence on help-seeking. These results suggested the potential positive impact of self-approach and the detrimental influence of task-approach goals on help-seeking in e-learning environment. Conceptual issues and pedagogical implications for online instructions are discussed.

**Keywords:** Achievement approach goal; Intrinsic/Extrinsic motivation; Help-seeking; e-Learning; College students

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## 1. Introduction

Enrollments in online courses at universities in the United States have grown substantially faster than the growth of overall higher education enrollment in recent years. For example, the number of students taking at least one online course has grown to 6.7 million (32% of all students), an increase by over 570,000 since Fall 2012, a growth at an all-time high since the last decade (Allen & Seaman, 2013). Furthermore, approximately 69% of higher education institutions reported an increased demand for new e-learning offerings, the highest for the past decade (Allen & Seaman, 2013). It is clear that with the rapid development of new technologies, interactive online environments have become widespread and made a profound influence on the daily practice of education (Dillon & Gabbard, 1998). While the education community embraced the rapid growth of e-learning, it also faced with the challenges of this new movement of education. From its onset, student attrition in e-learning has been a major concern which has been attributed to a variety of reasons, including sense of belonging to a learning community, motivation, and the quality of communication with the instructor, etc. (Hart, 2012). It is vital to address the question of how to best support students' e-learning (Rakes & Dunn, 2010).

While online courses may be equivalent to traditional courses in terms of quality of learning, they present instructors and students with distinct challenges. Besides the often larger student-to-teacher ratio than traditional face to face classes, online students are expected to tackle the course tasks and self-regulate the corresponding learning processes to a greater extent (Schworm & Gruber, 2012). Another major challenge is that online students are more susceptible to feelings of isolation due to lack of physical proximity to other students and instructors (McInerney & Roberts, 2004). Often times, they tend to feel lost in the cyber space. Therefore, they need help to overcome these challenges, especially when they inevitably and repeatedly face problems that require help from external resources including instructors, peers, websites, and video tutorials etc. As an important self-regulated learning strategy (Newman, 2008), help-seeking is found to be associated with increased student engagement in the learning process and positive academic outcomes (Barnard, Paton, & Lan, 2008; Rakes & Dunn, 2010). Further, help-seeking is listed as an important indicator of student college success (Karabenick & Newman, 2006). Unfortunately, many students are reluctant to seek help, partially due to motivation issues including achievement goals (Alevin, Stahl, Schworm, Fischer, & Wallace, 2003; Ryan & Pintrich, 1998).

Help-seeking is a desired study habit in e-learning, particularly when proximity with peers and instructors is minimal. Therefore, there is a vital interest among researchers and educators in understanding what influences online help-seeking, especially with regard to motivational factors. The present study investigated the differential influences of achievement goals and intrinsic/extrinsic motivation on help-seeking in e-learning. The purpose of this study was threefold. First, we attempted to compare the direct and indirect influences of approach goals on students' online help-seeking based on the  $2 \times 2$  (Elliot & McGregor, 2001) and the  $3 \times 2$  framework (Elliot, Murayama, & Pekrun, 2011). Second, we endeavored to examine the relationships between approach goals and students' personal goal orientation, namely,

intrinsic/extrinsic motivation in e-learning. Third, we examined how online students' intrinsic/extrinsic motivation predicts their help-seeking behavior.

Our study addressed two areas that have not been adequately examined in earlier studies on the relationship between achievement goals and help-seeking (e.g., Arbreton, 1998; Linnenbrink, 2005; Newman, 1998, 2008; Ryan & Pintrich, 1997, 1998; Ryan, Pintrich, & Midgley, 2001). First, we tested the relationship with the online population based on the earlier studies which were mostly focused on traditional face-to-face class population. As e-learning and traditional face to face learning vary greatly in various facets including help-seeking, it's important to investigate whether the relationships found in face to face classes from previous results hold true in e-learning (Aleven et al., 2003). Second, we explored the relationship of both the old  $2 \times 2$  and new  $3 \times 2$  models and help-seeking to advance earlier studies which merely focused on the old model (Elliot & McGregor, 2001, Elliot, Murayama, & Pekrun, 2011). As Elliot and his colleagues proposed the new model and argued the conceptual difference between the earlier and newer constructs from the two models, it is important to cross examine the new model with the online population and explore the potential relationship between the new constructs of achievement goals and help-seeking.

## **2. Literature review**

### *2.1. Help-seeking in e-learning*

As a self-regulated learning strategy (Bembenutty, McKeachie, Karabenick, & Lin, 1998; Järvelä, Järvenoja, & Malmberg, 2012), help-seeking plays a critical role in students' academic achievement (Ryan, Gheene, & Midgley, 1998). This role is found to carry even more weight in online classes (Mahasneh, Sowan, & Nassar, 2012) where non-verbal cues and physical interactions are limited or minimal in comparison with a face-to-face class. Research shows students who actively seek help tend to perform significantly better than those who do not in an online class (Mahasneh, Sowan, & Nassar, 2012). Further, help-seeking can be an effective learning strategy associated with increased student engagement in the learning process and positive academic outcomes in e-learning environments (Aleven et al., 2003; Barnard, Paton, & Lan, 2008; Rakes & Dunn, 2010; Wolters, Pintrich, & Karabenick, 2005). Help-seeking is a two-part process. First students must recognize the need for help and then they must decide whether or not to actually make the request (Ryan & Pintrich, 1998).

As online education programs are expanding at an increasingly fast pace, much remains to be explored with regard to unique characteristics and dynamics of e-learning (Bernard et al., 2009). Online students are more susceptible to feelings of isolation due to lack of physical proximity to other students and instructors. Increasing interaction in e-learning classes may help ameliorate the problem; however, much of this interaction is superficial and does not do enough to promote meaningful social interaction (Yang & Liu, 2008; McInnerney & Roberts, 2004). As a result of these challenges, online students may feel that seeking help from classmates and instructors is futile. Many students decide not to take advantage of the benefits of help-seeking strategy, partly due to their achievement goals (Roussel, Elliot, & Feltman, 2011; Ryan & Pintrich, 1998). For example, students who endorse performance achievement goals have been found to be less likely to seek help because they do not see the intrinsic value in mastering course content (Linnenbrink, 2005; Bong, 2009). However, there is a lack of clarity in the relationship between types of performance goals and help-seeking, with some studies showing only performance-

avoidance goals resulting in less help-seeking (Putwain & Daniels, 2010; Putwain & Symes, 2012). It is unclear whether the different types of performance goals relate to help-seeking in a different manner, and whether these relationships found in traditional face to face classes translate into online settings. As e-learning becomes increasingly popular, it is important for researchers to look at the differences between online and face to face classes, especially in the potentially differential roles of achievement goals students endorse in help-seeking.

## *2.2. Approach goals in the two achievement goal models*

According to earlier motivation theory and the  $2 \times 2$  achievement goal framework (Ames & Archer, 1988; Elliot, & Dweck, 2005; Elliot & Church, 1997; Elliot & McGregor, 2001), students form achievement goals implicitly or explicitly based information on the definition and valence of competence. The definition of competence may be mastery based by means of absolute or intrapersonal standards, or performance based via normative standards. The valence of competence, on the other hand, breaks into approach or avoidance dimensions, with approach goals focusing on success and avoidance goals on failure. Nevertheless, the  $2 \times 2$  model was challenged when Elliot and his colleagues (2011) proposed and tested a  $3 \times 2$  model of achievement goals based on three ways to define competence, i.e., self-, task-, and other-orientation. Elliot, Murayama, and Pekrun (2011) maintained that self-based goals use intrapersonal standard as evaluative referent in terms of temporal sequence, while task-based goals focus on the demands of a particular task. Meanwhile, they posited that other-based goals are analogous to performance goals using social comparison as evaluative referent (Elliot & McGregor, 2001, Elliot, Murayama, & Pekrun, 2011). They further postulated that the  $3 \times 2$  model and the  $2 \times 2$  model are similar in the valence dimension, in that approach-based goals focus on success whereas avoidance-based goals center on failure (Elliot & McGregor, 2001, Elliot, Murayama, & Pekrun, 2011). Considering the major conceptual difference between the two models proposed by Elliot and his colleagues (Elliot, Murayama, & Pekrun, 2011), we focused on the definition dimension of competence in the achievement goal framework in our study.

Previous research has established a link between students' achievement goals from a  $2 \times 2$  model (Elliot & Dweck, 2005; Elliot & McGregor, 2001) (Fig. 1) and help-seeking in a traditional learning setting (Alevin et al., 2003; Arbreton, 1998). Students with mastery goals were found to be more likely to focus on learning and understanding and endorse a more intrinsic orientation (Alevin et al., 2003). In contrast, students with performance goals tend to focus on social comparison and endorse an extrinsic motivation (Arbreton, 1998). Furthermore, Ryan and Pintrich (1998) found both direct and indirect effects of students' achievement goals on help-seeking. Students with mastery goals tend to seek help, whereas those with performance goals tend to avoid seeking help. A plausible explanation of this difference is that students with mastery goals view help-seeking as a strategy to better understand the subject matter, while students with performance goals tend to perceive help-seeking as a threat to demonstrate their ability. However, research is lacking in testing this relationship in e-learning (Alevin et al., 2003). Ascertaining this relationship has significant implications for the design and instruction of e-learning.

Based on an earlier  $2 \times 2$  achievement goal framework (Elliot, & Dweck, 2005; Elliot & McGregor, 2001), Elliot and his colleagues (Elliot, Murayama, & Pekrun, 2011) proposed and tested a  $3 \times 2$  model of achievement goals (Fig. 2) with three ways to define competence, i.e., self-, task-, and other-orientation, and two approaches to valence

attitudes, i.e., approaching vs. avoiding. Previous studies demonstrate that mastery-approach goals from the 2 × 2 model are related to adaptive help-seeking behaviour (Linnenbrink, 2005; Ryan & Pintrich, 1997, 1998). Students’ who seek help may be more likely to do so because they want to learn as much as they can, not only from the course instructor, but also from their advanced peers. On the other hand, students with performance-approach were found to be less likely to seek help in the learning process (Karabenick, 2003). With the new 3 × 2 model validated in two empirical studies using the traditional face-to-face population (Elliot, Murayama, & Pekrun, 2011), it remains unclear whether the approach goals in the 3 × 2 model maintain relationships with help-seeking similar to those revealed in the old 2 × 2 model and in the e-learning environment (Elliot & McGregor, 2001).

		Definition	
		Absolute/ intrapersonal (mastery)	Normative (performance)
Valence	Positive (approaching success)	Mastery- approach goal	Performance- approach goal
	Negative (avoiding failure)	Mastery- avoidance goal	Performance- avoidance goal

**Fig. 1.** The 2 × 2 achievement goal framework. Definition and valence represent the two dimensions of competence. Absolute/intrapersonal and normative represent the two ways that competence can be defined; positive and negative represent the two ways that competence can be valenced. Adapted from “A 2 x 2 achievement goal framework,” by Eliot and McGregor (2001)

		Definition		
		Absolute (task)	Intrapersonal (self)	Interpersonal (other)
Valence	Positive (approaching success)	Task- approach goal	Self- approach goal	Other- approach goal
	Negative (avoiding failure)	Task- avoidance goal	Self- avoidance goal	Other- avoidance goal

**Fig. 2.** The 3 × 2 achievement goal framework. Definition and valence represent the two dimensions of competence. Absolute, intrapersonal, and interpersonal represent the three ways that competence can be defined; positive and negative represent the two ways that competence can be valenced. Adapted from “A 3 x 2 achievement goal model” by Elliot, Murayama, and Pekrun (2011)

### *2.3. Intrinsic/Extrinsic motivation*

Intrinsic/extrinsic motivation is another important motivation factor for e-learning students (Cobb, 2010; Lynch & Dembo, 2004). Pintrich, Smith, Garcia, and McKeachie (1991) defined intrinsic/extrinsic motivation as a learner's general goal toward a course. Students with intrinsic motivation participate in a learning task for internal reasons such as challenge, curiosity, and mastery. These students view the participation in the task as an end all to itself. In contrast, students with extrinsic motivation participate in a learning task for external reasons such as grades, rewards, performance, evaluation by others, and competition. They view their engagement in the learning task as the means to an end.

Intrinsic/extrinsic motivation has been linked with achievement goals set by students (Curry, Haderlie, & Ku, 1999; Schrum & Hong, 2002). In particular, mastery-approach goals are associated with intrinsic motivation, whereas performance-approach goals are linked with extrinsic motivation (Harackiewicz, Barron, & Elliot, 1998; Lynch & Dembo, 2004). In addition, recent research reported a positive association of intrinsic motivation and a negative association of extrinsic motivation with help-seeking in traditional face-to-face classes (Butler, 2006; Harackiewicz, Barron, & Elliot, 1998; Harris, Bonnett, Luckin, Yuill, & Avramides, 2009; Karabenick, 2003; Newman, 2008). Nevertheless, it is unclear whether the same relationships between students' help-seeking and personal goal orientations are present in online environment.

## **3. Project background and research questions**

In order to address the challenges and promote help-seeking in e-learning, it is important to examine the relationships of achievement goals with personal goal orientations and help-seeking. Elliot, Murayama, and Pekrun (2011)'s  $3 \times 2$  achievement goal framework provides us with a new vehicle to test such relationships in the online environment besides the old  $2 \times 2$  model (Elliot & McGregor, 2001). In particular, we intended to find out whether the positive relationship between mastery-approach goals and intrinsic motivation (e.g., Butler, 2006; Harackiewicz, Barron, & Elliot, 1998; Newman, 2008) holds true in online environment; whether self- and task-approach goals bear the same relationship with intrinsic motivation as mastery-approach goals do (Elliot, Murayama, & Pekrun, 2011); and whether other-approach goals are positively related to extrinsic motivation like performance-approach goals as observed in motivation literature (Elliot & Dweck, 2005; Newman, 1998).

Specifically, we addressed three research questions: (1) How do the approach goals in the  $3 \times 2$  framework predict online student help-seeking as compared to the  $2 \times 2$  framework? (2) How do the approach goals in the two frameworks compare in their prediction power to students' intrinsic and extrinsic motivation? (3) How does online students' intrinsic/extrinsic motivation predict their help-seeking behaviour?

## **4. Methods**

### *4.1. Data sources*

Data were collected from four online educational psychology classes at a southeast comprehensive university. A total of 93 students chose to participate in the study to receive course credit as part of a class project. Students who did not wish to participate in the study were given alternatives to receive their course credit. The sample was

predominantly White (72%), female (75%), upper-level undergraduates (54%), living off-campus (94%), and employed (94%).

All the participants were from educational psychology classes, with 50 at undergraduate level and 43 at graduate level. The upper level undergraduate course was hybrid class (80% online) with only three face-to-face meeting times, while the graduate class was 95% online with only one class meeting. Both the undergraduate and graduate classes had semester-long projects which require extensive coursework. However, students in all four classes had the opportunities of meeting with the instructors and fellow students face-to-face and/or online to discuss and collaborate on the projects. Further, clear instructions, guidelines, rubrics, and sample products for the projects were provided to help students accomplish the assignments with sufficient guidance and minimal confusion.

4.2. Procedure

Students completed the measures toward the end of the semester. Students were surveyed about their achievement goals, personal goal orientations, e-learning experiences including help-seeking, and their basic demographic and academic information. IRB guidelines were followed in the data collection process.

4.3. Measures (see Table 1 for reliability information)

All measures used a seven-point Likert scale ranging from not true of me (1) to extremely true of me (7). The mean scores of each subscale were used in the data analyses.

**Table 1**

Descriptive statistics, Cronbach’s  $\alpha$ , and correlation coefficients of the main variables (N = 93)

Variables	Mean	SD		1	2	3	4	5	6	7
1. Extrinsic Goal	5.03	1.22	0.74	-						
2. Intrinsic Goal	5.23	0.99	0.78	.24*	-					
3. Help-Seeking	3.78	1.28	0.64	.44***	.30**	-				
4. Mastery-Approach	5.86	1.03	0.85	0.03	.60***	0.08	-			
5. Performance-Approach	4.56	1.7	0.92	.55***	0.14	.40***	0.2	-		
6. Self-Approach	5.42	1.24	0.85	.33**	.40***	.27**	.28**	.35**	-	
7. Task-Approach	6.06	1.06	0.93	.24*	.30**	0.03	.40***	.31**	.68***	-
8. Other-Approach	4.5	1.74	0.92	.50***	0.18	.47***	0.18	.86***	.37***	.29**

Note. \*\*\*  $p < .001$ . \*\*  $p < .01$ . \*  $p < .05$  (2-tailed).



#### 4.3.1. Achievement goal questionnaire

Three subscales of this questionnaire (Elliot, Murayama, & Pekrun, 2011) was used to measure students' three types of approach goals, namely, self-, task-, and other-approach goals from the new  $3 \times 2$  achievement goal framework in e-learning, with each subscale composed of three items. Sample item of self-approach goal is "To do better on the exams in this class than I typically do in this type of situation," other-approach goal "To outperform other students on the exams in this class," and task-approach goal "To get a lot of questions right on the exams in this class."

#### 4.3.2. Achievement goal questionnaire

Two subscales of this questionnaire (Elliot & McGregor, 2001) were used to measure students' two types of approach goals, namely, mastery- and performance-approach goals from the traditional  $2 \times 2$  achievement goal framework in e-learning, with each subscale composed of three items. Sample item of mastery-approach goal is "It is important for me to understand the content of this course as thoroughly as possible," and performance-approach goal "My goal in this class is to get a better grade than most of the other students."

#### 4.3.3. The motivated strategies for learning questionnaire (MSLQ)

In order to measure help-seeking and personal goal orientations, participants completed the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991). Developed by Pintrich and his colleagues (1991) from a social-cognitive perspective, the MSLQ measures students' motivation and self-regulated learning strategies related to a particular course. In the present study, the original subscales for Intrinsic Motivation, Extrinsic Motivation, and Help-seeking were used to assess online students' personal goal orientation and help-seeking behavior. Each subscale contains four items, with one item on Help-seeking being reversely coded "Even if I have trouble learning the material in this class, I try to do the work on my own, without help from anyone." Sample item of extrinsic motivation is "The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade," intrinsic motivation "The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible," and help-seeking "I try to identify students in this class whom I can ask for help if necessary."

## 5. Results

Analyses were conducted using SPSS and AMOS Version 19. We tested the hypothesized models of help-seeking of online students using path analyses, which allowed us to explore and compare the relationships between approach goals in the earlier and most recent framework of achievement goals, intrinsic and extrinsic motivation, and online help-seeking.

### 5.1. Preliminary analyses

The means and standard deviations of the variables are shown in Table 1, along with the alpha coefficients for multi-item variables and bivariate correlations among all variables in the study. As Table 1 shows, the mean score of students' help-seeking is the lowest ( $M$

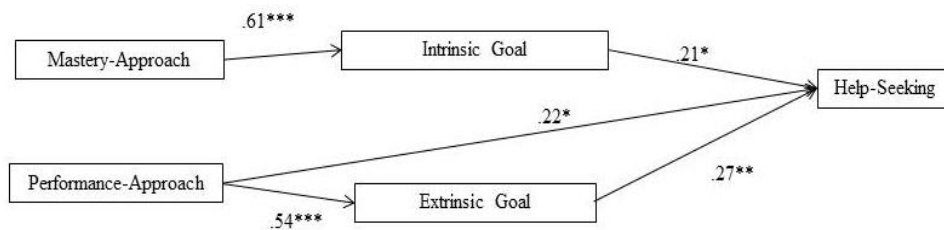
= 3.78) among all the major variables of the study. This low level could be attributed to the effective scaffolding system established in all four classes, including but not limited to the regular face-to-face and/or online meetings, the project guidelines, rubrics, and sample products. It is also worth noting that as an averaged central tendency, the mean score of help-seeking may have also been positively skewed by some students' help-seeking avoidance tendency. With this in mind, the present study focused on how different types of achievement goals influenced students' tendency to seek help or avoid seeking help as mediated by the intrinsic and extrinsic motivation.

We predicted that students with mastery-approach goal would endorse intrinsic motivation, and similarly, those with performance-approach goal would pursue extrinsic goals. As anticipated, mastery-approach was positive associated with intrinsic goal ( $r = .60, p < .001$ ) and performance approach positively associated with extrinsic goal ( $r = .55, p < .001$ ). Surprisingly, mastery-approach did not have simple correlation with help-seeking ( $r = .08, p > .05$ ), while performance-approach goal was positively associated with help-seeking. Another unexpected result is that unlike mastery-approach, extrinsic motivation had a positive simple correlation with both self- ( $r = .33, p < .01$ ) and task-approach goals ( $r = .24, p < .05$ ).

### 5.2. Paths analyses

The two hypothesized models of help-seeking among online students were tested separately based on the initial significant correlations among the variables as an attempt to compare and contrast the two achievement goal models in regards to their relationship with intrinsic and extrinsic goals and help-seeking among the online students.

#### 5.2.1. Model 1: Mastery- and performance-approach goals from $2 \times 2$ model



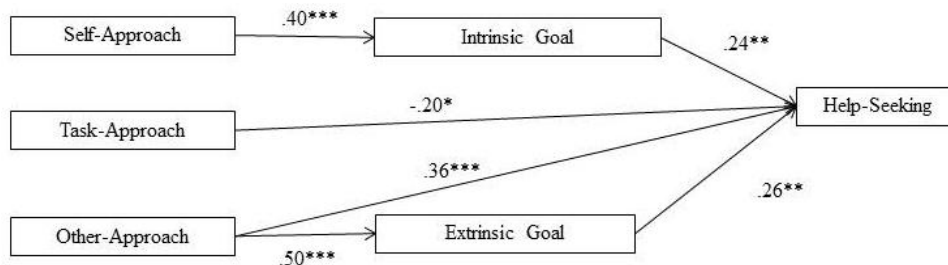
**Fig. 3.** Standardized regression weights of the path model of the relationship between achievement approach goals from the traditional  $2 \times 2$  model and help-seeking in e-learning. Only significant paths are represented in the model. \*\*\*  $p < .001$ . \*\*  $p < .01$ . \*  $p < .05$  (2-tailed).

In this model, we tested whether mastery-approach goals predict intrinsic goals and whether performance-approach goals predicts extrinsic goal, which then predicts help-seeking. This model did not adequately fit the data  $\chi^2 (df = 5) = 16.60$ , CFI = .89, GFI = .94, and RMSEA = .16. Based on the modification indices and the preliminary simple correlation between performance-approach goal and help-seeking, a direct path from performance-approach goal to help-seeking was added to the model. The final model showed an improved but still poor fit to our data: where  $\chi^2 (df = 4) = 12.30$ , CFI = .92, GFI = .95, and RMSEA = .15. Fig. 3 demonstrates the final path model for the sample with standardized path coefficients, indicating that help-seeking was predicted by both intrinsic and extrinsic motivation, and by performance-approach directly. The figure also

shows that performance-approach goals have both direct and indirect effects on help-seeking behavior among online students.

### 5.2.2. Model 2: Self-, task-, and other-approach goals from $3 \times 2$ model

In Model 2, we tested through path analyses whether self- and task-approach goals predict intrinsic and whether other-approach goals predict extrinsic motivation, which then predicts help-seeking. This model did not adequately fit the data  $\chi^2$  ( $df = 7$ ) = 21.93, CFI = .90, GFI = .93, and RMSEA = .15. We freed up a path from task-approach to intrinsic motivation considering the low and insignificant regression weight ( $r = .05$ ,  $p = .69$ ) and added two direct paths from other- and task-approach to help-seeking according to model modification indices in the final model, which showed a significantly improved fit to our data: where  $\chi^2$  ( $df = 6$ ) = 7.67, CFI = .99, GFI = .97, and RMSEA = .05.



**Fig. 4.** Standardized regression weights of the path model of the relationship between achievement approach goals from the new  $3 \times 2$  model and help-seeking in e-learning. Only significant paths are represented in the model. \*\*\*  $p < .001$ . \*\*  $p < .01$ . \*  $p < .05$  (2-tailed).

Fig. 4 demonstrates the final path model for the sample with standardized path coefficients, indicating that help-seeking was predicted by both intrinsic and extrinsic motivation. However, help-seeking was also predicted by task- and other-approach goals directly. Another unexpected finding was that task-approach did not predict intrinsic motivation ( $r = .02$ ,  $p > .05$ ), while predicting help-seeking negatively ( $r = -.20$ ,  $p < .05$ ). The figure also shows similar patterns of other-approach goals having both direct and indirect effects on help-seeking behavior like performance-approach goals among online students, but distinct relationship of self- and task-approach goals from mastery-approach goals with help-seeking as depicted in Fig. 1. The fit indices of the two final models are displayed in Table 2.

**Table 2**

Chi-squares and fit indices for online students' help-seeking of the two models

Model number and description <sup>a</sup>	$\chi^2$	$df$	$p$	GFI <sup>b</sup>	GFI <sup>b</sup>	RMSEA <sup>d</sup>
1. The old 2x2 model	12.30	4	0.02	.95	.92	.15
2. The new 3x2 model	7.67	6	0.26	.97	.99	.05

<sup>a</sup>The description indicates the variables that are allowed to affect fitness.

<sup>b</sup>Goodness-of-fit index (Kline, 2005).

<sup>c</sup>Normed comparative fit index (Bentler, 1990).

<sup>d</sup>Root-mean-square error of approximation (Hu & Bentler, 1999)

Note: As the indices indicate, Model 2 fits significantly better than Model 1

## 6. Discussions

In the study, we first compared the direct and indirect effects of achievement approach goals on online students' help-seeking from the  $3 \times 2$  and  $2 \times 2$  framework by Elliot and colleagues (Elliot, & Dweck, 2005; Elliot & McGregor, 2001; Elliot, Murayama, & Pekrun, 2011). Second, we examined whether the previously established relationships between mastery-approach goal and intrinsic motivation, and between performance-approach goal and extrinsic motivation apply to the online population and to the three approach goals from the new  $3 \times 2$  framework (Elliot, Murayama, & Pekrun, 2011). Finally, we tested the established positive association of intrinsic motivation and the negative association of extrinsic motivation with help-seeking from previous studies (Butler, 2006; Harackiewicz, Barron, & Elliot, 1998; Karabenick, 2003; Lynch & Dembo, 2004; Sharma, Dick, Chin, & Land, 2007), and particularly in traditional face-to-face classes (Butler, 2006; Harackiewicz, Barron, & Elliot, 1998; Karabenick, 2003).

### 6.1. Influences of achievement approach goals on help-seeking

Our results showed distinct paths between achievement approach goals and help-seeking in the two academic goal theoretical frameworks. In particular, while mastery-approach has an indirect influence on help-seeking among the online learners, performance-approach was found to have stronger direct as well as indirect influence on help-seeking. This adds to the debate in achievement goal literature on the potential positive influence of performance approach on learning against the earlier findings on the negative relationship between performance-approach and help-seeking (Karabenick, 2003). Second, while other-approach goals predicted help-seeking both directly and indirectly in a fashion similar to the performance-approach in the first  $2 \times 2$  model, self- and task-approach goals took completely different routes to help-seeking. Like mastery-approach, self-approach goals displayed indirect influences on help-seeking through intrinsic motivation. However, task-approach was found to have a negative direct influence on help-seeking, suggesting the more focused on the attainment of task-based competence, the less likely the learners are to seek help in an online learning environment. This differential path pattern between task- and self-approach goals resonates with the argument that these two goals are conceptually different (Elliot, Murayama, & Pekrun, 2011).

Our results of the differential influences of approach goals on help-seeking add to current literature showing mixed evidence for learners' mastery- and performance-approach and learning outcomes: some studies found a relationship while others showed none (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Linnenbrink-Garcia, Tyson, & Patall, 2008). The inconsistent results from recent literature as well as our study call for further examination between achievement goals and help-seeking before a definitive conclusion can be made.

### 6.2. Influences of achievement approach goals on intrinsic/extrinsic motivation

As to the second research question on the relationship between achievement approach goals from the two achievement goal models and intrinsic/extrinsic motivation, our results showed similar patterns of performance- and other-approach goals predicting extrinsic motivation, and mastery- and self-approach goals predicting intrinsic motivation in both the  $2 \times 2$  and  $3 \times 2$  frameworks (Elliot & McGregor, 2001; Elliot, Murayama, & Pekrun, 2011). These findings are consistent with the previous study results suggesting the positive relationship between mastery-approach goals and intrinsic motivation

(Harackiewicz, Barron, & Elliot, 1998) and between performance-approach goals and extrinsic motivation (Arbreton, 1998). However, our results show that task-approach goals had no significant influence on intrinsic motivation, which disagreed with the previous research results (Elliot, Murayama, & Pekrun, 2011). A plausible explanation is that the online students focused on successfully accomplishing academic tasks may not necessarily be concerned with the level of interest as much as the level of difficulty of a task. Apparently, further research in this area is needed before a definitive statement can be made about the motivating role of task-approach, particularly for the e-learning environment.

### *6.3. Influences of intrinsic/extrinsic motivation on help-seeking*

As Fig. 1 and Fig. 2 show, both extrinsic and intrinsic motivation predicted help-seeking behaviour among the online students, with extrinsic goal having a slightly stronger predictive power over intrinsic goal. This finding contributes to the discussion about the relationship between motivation and help-seeking. For instance, Lynch and Dembo (2004) reported an absence of relationship between help-seeking and intrinsic motivation, whereas Arbreton (1998) found that student motivation is directly related to help-seeking behaviors. More specifically, motivation influenced different types of help that students sought. Students with intrinsic motivation tended to ask for more instrumental help, while those with extrinsic motivation sought more executive help (Arbreton, 1998). Our results support Arbreton's (1998) finding and showed that both intrinsic and extrinsic motivation predicted help-seeking behaviors among the online students. This finding suggests that working on student motivation would be a plausible way to promote help-seeking behavior in the e-learning environments.

In order to address students' feeling of a lack of a close relationship with the instructor (Vonderwell, 2003) and their peers in the e-learning environment (Rakes & Dunn, 2010; Song, Singleton, Hill, & Koh, 2004), it is important to help online students develop adaptive help seeking skills (Aleven et al., 2003; Newman, 2008). Surprisingly, online students are often reluctant to seek help due to misconceptions, when in reality they may need help more than traditional face-to-face students due to the various challenges presented by the e-learning environment. Our study results indicate that students with mastery-approach are willing to seek help. This result is consistent with previous studies (Newman, 1998; Huang, Yang, Chiang, & Tzeng, 2012) and supports the argument that students with such goals are willing to seek assistance because they are motivated to learn. The mastery-approach goal and adaptive help-seeking behaviour would formulate adaptive cycles of learning (Linnenbrink, 2005; Ryan & Pintrich, 1997, 1998).

Our results also revealed that students with performance- or other-approach goals were willing to seek help. This finding shed some light on promoting help-seeking through motivation in the e-learning environment. It suggests that instructors should take advantages of willingness of help-seeking among the students who espoused performance-approach and other-approach goals. Different from previous study results on face-to-face classes (e.g., Karabenick, 2003; Linnenbrink, 2005), our study results suggest that approach goals influence students' help-seeking differentially between the two class delivery formats. While students with mastery-approach goals are more likely to seek help in face-to-face setting, students with performance- or other-approach goals tend to seek help in e-learning more. On the other hand, task-approach goals are found to have negative influence on help-seeking in e-learning, distinct from an earlier study (Elliot, Murayama, & Pekrun, 2011) showing beneficial effects of task-approach on

learning self-efficacy and proposing to promote task-approach over self-approach goals in the classroom. The incongruent findings suggest a need for further studies to differentiate the influence of task- and self-approach goals on help-seeking between face-to-face and e-learning classes. Our study results suggest a caution for e-learning instructors in promoting task-approach goals, a counter-argument against an earlier study (Elliot, Murayama, & Pekrun, 2011) derived from face-to-face settings. Considering the detrimental effects of task-approach goals and positive influences of self- and mastery-approach goals found in the study, it seems reasonable for the e-learning instructors to focus on the inherent value of online assignments and importance of students' self-growth instead of on the difficulty level of an online project. Further, the significant positive direct and indirect influences of performance- and other-approach goals indicate the importance of letting e-learning students know how they are doing in comparison with their peers to promote help-seeking. One thing worthy of note, though, is that the participants in our study were mostly employed, either part-time or full-time. Therefore, our study results only pertain to the non-traditional student population. It'll be interesting to investigate the potential differences among traditional full-time students who may or may not have different intentions taking an online class.

## **7. Significance of the study and future directions**

With the rapid growth of e-learning at universities in the United States (Allen & Seaman, 2013), help-seeking has become essential to promote engagement and academic success of online students (Aleven et al., 2003; McInnerney & Roberts, 2004; Newman, 2008; Rakes & Dunn, 2010). In this study, we sought to explore and compare the influences of achievement approach goals from the old and new achievement motivation models (Elliot & McGregor, 2001; Elliot, Murayama, & Pekrun, 2011) on online students' help-seeking through intrinsic/extrinsic motivation. Our results suggest that the achievement approach goals of the new model differ from those of the old model conceptually as Elliot, Murayama, and Pekrun (2011) argued. Further, our results showed the potential positive impact of performance- and other-approach on online students' help-seeking behaviour. Third, students with self- or task-approach goals tend to have dramatically different help-seeking tendencies, with task-approach goals' potential detrimental influences on e-learning students' help-seeking.

Overall, our path analyses results verified the conceptual difference between self- and task-competencies in academic goal setting as proposed by Elliot and his colleagues (2011). The model fit indices as shown in Tables 1 and 2 suggest that the new  $3 \times 2$  model has superior predictive power over students' help-seeking behaviour in comparison with the old  $2 \times 2$  model. Further, our results highlighted the potential positive impact of performance- or other-approach and the unexpected detrimental influences of task-approach on online students' help-seeking behaviour. Instructors may need to reconsider the role of approach goals in e-learning, promoting other- and self-while discouraging task-approach goals. However, it is worth cautioning that even though task-approach goals appears to have threatened help-seeking in our study, it may still be an important quality in self-directed online learning. What instructors can do may be finding alternative ways to facilitate students' help-seeking when students have high task-approach goals, and to explore possible factors/personal attributes that may moderate their task-oriented goals. Further, the differential paths of approach goals to help-seeking in our study suggest a need to address the motivational differences between online and traditional face-to-face classes.

Our study results add to the argument that both intrinsically and extrinsically motivated students tend to seek help, but may differ in the types of help they ask for (Arbreton, 1998). Since there are various forms of help-seeking which may be adaptive or non-adaptive (Hsu, Ching, Mathews, & Carr-Chellman, 2009; van de Sande, 2011), future research may examine how approach goals and personal goal orientations predict different types of help online students seek. Second, although literature demonstrates a strong correlation between measures of help-seeking and help-seeking behavior (e.g., Roll, Aleven, McLaren, & Koedinger, 2011), there are criticisms that help-seeking research is more often than not limited to self-report measures such as questionnaires (Mäkitalo-Siegl & Fischer, 2011). Future research may attempt to test the influences of achievement goals on actual help-seeking behaviour instead of help-seeking tendency. Third, previous study results suggest the potential impact of students' perceptions of classroom goal structure on help-seeking (Mäkitalo-Siegl, Kohnle, & Fischer, 2011; Ryan, Gheen, & Midgley, 1998). Hence, it will be worthwhile examining whether help-seeking may be affected by achievement goals at the classroom besides personal level. Fourth, due to the relatively small sample size (N=93), we only focused on the definition dimension of the achievement goal framework. Future studies may include the valence dimension in exploring the roles of achievement goals in online help-seeking including avoidance as well as approach goals. In so doing, more conclusive findings can be made about the role of task-approach and task-avoidance goals in online help-seeking. As previous research indicates task-approach goals as an important quality in self-directed e-learning (Elliot, Murayama, & Pekrun, 2011), future research may explore other ways to facilitate students' help-seeking when students have high task-approach goals and possible factors such as personal attributes that moderate the relationship between task-oriented goals and online help-seeking. Fifth, as this study only focused on the potential impact of students' achievement goals on help-seeking, future research could examine the relationship between the nature of projects/assignments and help-seeking in e-learning.

Overall, our study results suggest that students' achievement goals and intrinsic/extrinsic motivation need to be addressed in the design of online instruction to promote student use of the beneficial help-seeking in the e-learning environment. As our study compared the differential influences of approach goals on help-seeking in e-learning between the two models (Elliot & McGregor, 2001; Elliot, Murayama, & Pekrun, 2011), future studies may focus on the potential direct influence of avoidance goals on students' help-seeking in e-learning as well as indirect influence through intrinsic/extrinsic motivation based on the old and new achievement motivation models.

## References

- 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*(3), 277–320.
- Allen, E. I., & Seaman, J. (2013). *Changing course: Ten years of tracking online education in the United States*. Retrieved from <http://www.onlinelearningsurvey.com/reports/changingcourse.pdf>.
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Student learning strategies and achievement motivation. *Journal of Educational Psychology, 18*, 409–414.
- Arbreton, A. (1998). Student goal orientation and help-seeking strategy use. In S. A. Karabenick (Ed.), *Strategic help seeking: Implications for learning and teaching* (pp. 95–116). Mahwah, NJ: Erlbaum.

- Barnard, L., Paton, V., & Lan, W. (2008). Online self-regulatory learning behaviors as a mediator in the relationship between online course perceptions with achievement. *The International Review of Research in Open and Distance Learning*, 9(2), 1–11.
- Bembenutty, H., McKeachie, W. J., Karabenick, S. A., & Lin, Y. (1998). *The relationship between test anxiety and self-regulation on students' motivation and learning*. Paper presented at the annual meeting of the American Psychological Society, Washington, DC.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238–246.
- Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research*, 79(3), 1243–1289.
- Bong, M. (2009). Age related differences in achievement goal differentiation. *Journal of Educational Psychology*, 101(4), 879–896.
- Butler, R. (2006). An achievement goal perspective on student help seeking and teacher help giving in the classroom: Theory, research, and educational implications. In S. A. Karabenick & R. S. Newman. (Eds.), *Help Seeking in Academic Settings*. London: Lawrence Erlbaum.
- Cobb, R. Jr. (2010, November). *Learners' goal orientation as a factor of successful academic performance in online learning experiences*. Paper presented at the 3rd International Conference of Education, Research, and Innovation, Madrid, Spain.
- Curry, J., Haderlie, S., & Ku, T. (1999). Specified learning goals and their effect on learners' representations of a hypertext reading environment. *International Journal of Instructional Media* 26(1), 43–51.
- Dillon, A., & Gabbard, R. (1998). Hypermedia as an educational technology: A review of the quantitative search literature on learner comprehension, control, and style. *Review of Educational Research*, 68(3), 322–349.
- Elliot, A. J., & Dweck, C. S. (Eds.). (2005). *Handbook of competence and motivation*. New York: Guilford Press.
- Elliot, A. J., & Church, M. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, 72, 218–232.
- Elliot, A. J., & McGregor, H. (2001). A 2 x 2 achievement goal framework. *Journal of Personality and Social Psychology*, 80, 501–509.
- Elliot, A. J., Murayama, K., & Pekrun, R. (2011). A 3 x 2 achievement goal model. *Journal of Educational Psychology*, 103, 632–648.
- Harackiewicz, J. M., Barron, K. E., & Elliot, A. J. (1998). Rethinking achievement goals: When are they adaptive for college students and why? *Educational Psychologist*, 33(1), 1–21.
- Harris, A., Bonnett, V., Luckin, R., Yuill, N., & Avramides, K. (2009). Scaffolding effective help-seeking behaviour in mastery and performance oriented learners. *Proceedings of the 2009 conference on Artificial Intelligence in Education: Building Learning Systems that Care: From Knowledge Representation to Affective Modelling* (pp. 425–432). Netherlands: IOS Press Amsterdam.
- Hart, C. (2012). Factors associated with student persistence in an online program of study: A review of the literature. *Journal of Interactive Online Learning*, 11(1), 19–42.
- Hsu, Y. C., Ching, Y. H., Mathews, J. P., & Carr-Chellman, A. (2009). Undergraduate students' self-regulated learning experience in web-based learning environments. *Quarterly Review of Distance Education*, 10(2), 109–121.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55.



- Huang, J. J. S., Yang, J. H. S., Chiang, P. Y. F., & Tzeng, L. S. Y. (2012). Building an e-portfolio learning model: Goal orientation and metacognitive strategies. *Knowledge Management & E-Learning*, 4(1), 16–36.
- Hulleman, C. S., Schrager, S. M., Bodmann, S. M., & Harackiewicz, J. M. (2010). A meta-analytic review of achievement goal measures: Different labels for the same constructs or different constructs with similar labels? *Psychological Bulletin*, 136(1), 422–449.
- Järvelä, S., Järvenoja, H., & Malmberg, J. (2012). How elementary school students' motivation is connected to self-regulation. *Educational Research and Evaluation: An International Journal on Theory and Practice*, 18(1), 65–84.
- Karabenick, S. A. (2003). Help-seeking in large college classes: A person-centered approach. *Contemporary Educational Psychology*, 28, 37–58.
- Karabenick, S. A., & Newman, R. S. (Eds.) (2006). *Help-seeking in academic settings: Goals, groups, and contexts*. Mahwah, NJ: Lawrence Erlbaum.
- Kline, R. B. (2005). *Principles and practice of structural equation modelling* (2nd ed.). New York: The Guilford Press.
- Linnenbrink, E. A. (2005). The dilemma of performance-approach goals: The use of multiple goal contexts to promote students' motivation and learning. *Journal of Educational Psychology*, 97, 197–213.
- Linnenbrink-Garcia, E. A., Tyson, D. F., & Patall, E. A. (2008). When are achievement goal orientation beneficial for academic achievement? A closer look at main effects and moderating factors. *International Review of Social Psychology*, 21, 19–70.
- Lynch, R., & Dembo, M. (2004). The Relationship between self-regulation and online learning in a blended learning context. *The international Review of Research in Open and Distance Learning*, 5(2), Retrieved from: <http://www.irrodl.org/index.php/irrodl/article/view/189/271>.
- Mahasneh, R. A., Sowan, A. K., & Nassar, Y. H. (2012). Academic help-Seeking in online and face-to-face learning environments. *E-Learning and Digital Media*, 9(2), 196–210.
- 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.
- 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.
- McInnerney, J. M., & Roberts, T. S. (2004). Online learning: Social interaction and the creation of a sense of community. *Educational Technology & Society*, 7(3), 73–81.
- Newman, R. S. (1998). Students' help-seeking during problem solving: Influences of personal and contextual achievement goals. *Journal of Educational Psychology*, 90, 644–658.
- 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). New York: Lawrence Erlbaum.
- Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. Ann Arbor: University of Michigan, National Center for Research to Improve Postsecondary Teaching and Learning.
- Putwain, D., & Daniels, R. (2010). Is the relationship between competence beliefs and test anxiety influenced by goal orientation? *Learning and Individual Differences*, 20, 8–13.
- Putwain, D., & Symes, W. (2012). Achievement goals as mediators of the relationship

- between competence beliefs and test anxiety. *British Journal of Educational Psychology*, 88(2), 207–224. doi: 10.1111/j.2044-8279.2011.02021.x
- 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(1), 78–93.
- Roll, I., Alevan, V., McLaren, B. M., & Koedinger, K. R. (2011). Improving students' help-seeking skills using metacognitive feedback in an intelligent tutoring system. *Learning and Instruction*, 21(2), 267–280.
- 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.
- Ryan, A. M., Gheen, M. H., & Midgley, C. (1998). Why do some students avoid asking for help? An examination of the interplay among students' academic efficacy, teachers' social-emotional role, and the classroom goal structure. *Journal of Educational Psychology*, 90(3), 528–535. doi: 10.1037/0022-0663.90.3.528.
- 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., & Pintrich, P. R. (1998). Achievement and social motivational influences on help seeking in the classroom. In S. A. Karabenick (Ed.), *Strategic help seeking: Implications for learning and teaching* (pp. 117–139). Mahwah, NJ: Erlbaum.
- Ryan, A. M., Pintrich, P. R., & Midgley, C. (2001). Avoiding seeking help in the classroom: Who and why? *Educational Psychology Review*, 13, 93–114. doi:10.1023/A:1009013420053
- Sharma, S., Dick, G., Chin, W., & Land, L. P. W. (2007). Self-regulation and e-learning. *Proceedings of the Fifteenth European Conference on Information Systems* (pp. 383–394). University of St. Gallen, St. Gallen.
- Schrum, L., & Hong, S. (2002). Dimensions and strategies for online success: Voices from experienced educators. *Journal of Asynchronous Learning Networks* 6(1). Retrieved from: <http://actxlearning.pbworks.com/f/10.1.1.109.3649.pdf>.
- Schworm, S., & Gruber, H. (2012). e-Learning in universities: Supporting help-seeking process by instructional prompts. *British Journal of Educational Technology*, 43(2), 272–281.
- Song, L., Singleton, E., Hill, J., & Koh, M. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *The Internet and Higher Education*, 7(1), 59–70.
- van de Sande, C. (2011). A description and characterization of student activity in an open, online, mathematics help forum. *Educational Studies in Mathematics*, 77, 53–78. doi: 10.1007/s10649-011-9300-y
- Vonderwell, S. (2003). An examination of asynchronous communication experiences and perspectives of students in an online course: A case study. *The Internet and Higher Education*, 6, 77–90.
- Wolters, C., Pintrich, P., & Karabenick, S. (2005). Assessing academic self-regulated learning. In K. Moore & L. Lippman (Eds.), *What do children need to flourish?: Conceptualizing and measuring indicators of positive development* (pp. 251–270). New York, NY: Springer.
- Yang, H. H., & Liu, Y. (2008). Building a sense of community for text-based computer-mediated communication courses. *Journal of Educational Technology Systems*, 36, 393–413.