Students' Groupwork Management in Online Collaborative Learning Environments

Jianzhong Xu[1*], Jianxia Du[2] and Xitao Fan[2]

[1]Department of Leadership and Foundations, Mississippi State University, P.O. Box 6037, Mississippi State, MS 39762, USA // [2]Faculty of Education, University of Macau, Av. Padre Tomas Pereira, TaipaMacao, China // jx18@colled.msstate.edu // jianxiadu@umac.mo // xtfan@umac.mo

[*]Corresponding author

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ABSTRACT

The present study investigates empirical models of groupwork management in online collaborative learning environments, based on the data from 298 students (86 groups) in United States. Data revealed that, at the group level, groupwork management was positively associated with feedback and help seeking. Data further revealed that, at the individual level, groupwork management was positively associated with feedback, peer- and learning-oriented reasons, help seeking, and the number of online courses. In addition, older students were found more frequently to manage online groupwork. The findings are discussed in the context of related literature in the field. Our study suggests directions for practice and future research regarding online groupwork management.

Keyword

Collaborative learning, Homework, Online groupwork, Self-regulated learning

Introduction

The trend towards online learning has propelled many instructors to incorporate online groups in their classes. Online groups are usually small (e.g., ranging from two to four students) and heterogeneous groups, designed to help online students, for example, develop problem-solving skills, share and challenge one another's ideas, and better prepare them for future careers (Jonassen, 2000; Koh, Barbour, & Hill, 2010; Smith et al., 2011).

Yet, online groupwork presents new challenges for students. They are required to manage online groupwork, including arranging their online and offline study environments (Deimann & Bastiaens, 2010; Whipp & Chiarelli, 2004), coordinating time for groupwork (Biasutti, 2011; Gafni & Geri, 2010), handling online and offline distractions (Bigenho, 2011; Whipp & Chiarelli, 2004), keeping themselves motivated (Liu, Joy, & Griffiths, 2010; Smith et al., 2011), and coping with negative emotions in the groupwork process (Ku, Tseng, & Akarasriworn, 2013; Wosnitza & Volet, 2005).

As a number of scholars (Choi & Kang, 2010; Rovai, 2007; Volet, Vauras, & Salonen, 2009) have been calling for attention to these challenges, it is obvious that these issues warrant our investigation. Thus, it would be important to examine factors that may influence students' groupwork management in online environments. A study such as this is especially important, as students tend to hold a more negative attitude toward online groupwork than face-to-face groupwork (e.g., Smith et al., 2011), and as they often face additional logistical issues (e.g., varying time zones and work schedules, and fewer channels for communication) in engaging in group-oriented online activities (Havard, Du, & Xu, 2008; Liu et al., 2010).

Theoretical framework

One framework pertaining to online groupwork management is a self-regulated learning perspective (Pintrich, 2004; Zimmerman, 2008), particularly from the view of volitional control (Corno, 1993, 2004; Deimann & Bastiaens, 2010). The term *volition* refers to both the strength of will to complete a task and the diligence of pursuit (Corno, 1993). It is primarily concerned with issues of implementation that occur after a specific goal is set, to sustain one's intention to follow through the goal despite temptations or competing personal strivings. It involves a range of

regulatory activities of a purposeful striving toward the attainment of the goal, including, for instance, budgeting time, monitoring motivation, and controlling emotion (Corno, 2004).

Volitional control is particularly critical to managing online groupwork because goals of groupwork are usually set by online instructors; the main task for students is to deal with the demands of following through online groupwork. They are required to sustain the needed focus and effort to complete their work in online collaborative learning environments, with less structure and time constraints than exist in face-to-face classrooms.

A self-regulation perspective (Garcia, McCann, Turner, & Roska, 1998; Pintrich & Zusho, 2002; Schunk, 2005) suggests that the use of self-regulatory strategies is influenced by goal orientation (e.g., purpose), task value (e.g., importance), and task interest (e.g., appeal). For example, Garcia et al. (1998) linked volition with expectancy-value theory (Eccles, 1983), particularly task value to implementing and protecting intention. They further hypothesized that volitional control is affected by the pleasure an individual experiences while engaging in a specific task and the value one attaches to the task. Specifically, based on expectancy-value theory, Warton (2001) pointed to the importance of task value in completing a task, including (a) task interest and (b) task utility (the purposes of a task).

As an individual with a greater interest in a task and viewing it as more important is more likely to employ self-regulatory strategies (Pintrich & Zusho, 2002), interest and task value may influence self-regulation (Schunk, 2005), with online groupwork management in particular. Furthermore, as a self-regulation perspective recognizes that individual and environmental differences may influence self-regulation (Pintrich, 2004), online groupwork management may be affected by student characteristics as well as help seeking and feedback. For example, seeking help from peers may enhance a students' efforts to manage their work (Wolters, 2011), which may further affect peers in online collaborative learning environments.

Taken together, this body of literature suggests that online groupwork management may be affected by a range of variables such as goal orientation, task value, task interest, affective attitude, help seeking, feedback, and student characteristics. Consequently, there is a need to incorporate these variables in models of groupwork management.

Studies pertaining to online groupwork management

As more university instructors incorporate online groupwork in their courses, a growing number of studies have examined student experiences with this (Gafni & Geri, 2010; Rovai, 2007; Smith et al., 2011; Wosnitza & Volet, 2005). For example, Smith et al. (2011) found that students held a more negative attitude toward online groupwork than face-to-face groupwork (e.g., less motivated to engage in groupwork). More specifically, Gafni and Geri (2010) found that students were more likely to follow through their individual task on time, whereas they tended to put off the collaborative aspect of the task until the final weeks of the semester. Similarly, Wosnitza and Volet (2005) found that online students often faced the issue of social emotion in online collaborative group settings. For example, one student was "really angry" because one group member was hardly made any contribution to online groupwork, which raised the workload for other group members.

Still other studies alluded to the emerging issue of environmental control in online learning environments. Whipp and Chiarelli (2004) examined students' self-regulatory strategies in an online technology course. Data revealed that students used different self-regulated learning strategies (e.g., setting up quiet areas in their homes for their online work). Their study implied that the use of self-regulatory strategies was affected by motivational influences (e.g., goal orientation) and environmental influences (e.g., helpful feedback from instructor). It further implied that the online groupwork may present additional challenges for group regulation, as what is at stake for groupwork is not just about managing one's own environment. More important, it is also about managing their group members' study environment (i.e., due to increased interdependence on peers).

To summarize, this line of studies suggests that groupwork presents multiple challenges for group members in online environments. However, few studies have examined multiple factors that may influence students' effort at managing these challenges.

The present investigation

The aim of the present investigation was to link students' groupwork management in online environments to multiple variables at the individual and group level. Understanding of these relevant variables and factors for online groupwork management will provide new insights about how to create a better learning environment for online collaborative groupwork. Our empirical investigation was carried out in the context of multi-level modeling, to address the issues introduced by nested data structure (i.e., individuals nested under groups in the online collaborative learning groupwork setting). Several related multi-level models were examined, concerning the particular predictor variables included and the level of these variables.

Method

Participants

The participants in the present study consisted of 298 students (86 groups) from one university in the southeastern United States. These online groups ranged from 2 to 4 students (M = 3.47, SD = .63). Specifically, the number of the groups with 2, 3, and 4 students were 6 (7.0%), 34 (39.5%), and 46 (53.5%), respectively.

Of these participants, 167 were females (56.0%) and 131 were males (44.0%). The racial/ethnic breakdown was 139 Caucasians (46.6%), 138 African Americans (46.3%), and 21 students from other backgrounds (7.1%). Specifically, the number of all-male groups, all-female groups, and mixed gender groups were 12 (14.0%), 17 (19.8%), and 57 (66.3%). Meanwhile, the number of all-Caucasian groups, all-African-American groups, and mixed racial/ethnic groups were 14 (16.3%), 14 (16.3%), and 58 (67.4%).

Approximately three-fourths of the participants were full-time students (76.5%). Two-thirds of the participants were 30 years or younger (67.2%), whereas one-third of them were over 30 years old (32.8%). These participants were recruited from one graduate-level course from 2009 to 2012. No significant differences were found across these years relating to their background characteristics (e.g., race, age, and gender).

Online groupwork

The course focused on theories and principles of instructional design, strategies for developing multimedia and for applying design models, and evaluation of related educational software. It was delivered through *myCourses*, which was used to deliver online courses through various communication tools such as chat rooms, discussion boards, and emails.

In the beginning of the semester, the participants were randomly assigned to online groups by the instructor. Each group was then asked to select a group leader, who was responsible for facilitating the flow of the groupwrok (e.g., coordinating specific tasks among the group members such as designing the website, incorporating relevant images, and writing up the paper). The final group project required each group to select a genuine instructional problem, to design and develop a plan to solve this problem, and to present its evaluation. The participants were required to involve various discussion activities with their members through *myCourses*.

Guidance and training on group collaboration were provided throughout the project planning, execution, and reflection process. When planning the project, the participants received written guidelines with evaluation criteria for individuals and groups. Training was then offered for each group leader in online chat rooms relating to group function. In addition, each group was asked to present its proposal with required contents including division of labor and time management. Advice was then solicited from peers and the instructor. Following that, online tutoring was offered to tackle specific problems encountered by respective groups to them to timely adjust group collaboration in the process. The participants were further asked to include in self-reflection in their presentation on how they approached collaboration.

Measures

Students were asked about how many online courses they took previously, ranging from *none* to *four or more*. A number of scales were used in the current investigation (see Table 1).

Table 1. Scales and sample items

Scales (Number of items)	Sample items	α (CI)
Feedback [a](5)	Monitored by the group members. Monitored by the instructor.	.80 (.77, .84)
Peer-oriented reasons [b](4)	Participating online GW brings you approval from group members. Participating online GW gives you opportunities to work with group members.	.78 (.74, .82)
Learning-oriented reasons [b](5)	Participating online GW helps you learn communication skills. Participating online GW helps you work more productively.	.83 (.80, .86)
Online GW interest [c](5)	I look forward to online GW. Online GW is fun. I enjoy online GW.	.94 (.93, .95)
Affective attitude (4)	My motivation or desire to participate online GW is _____ [d]online individual work. My attention while participating online GW is _____ [d]online individual work. My moods while participating online GW is _____ [e]online individual work.	.86 (.83, .88)
Help seeking [f](7)	I ask the instructor to clarify concepts I don't understand well. I try to identify students in my group whom I can ask for help if necessary. I try to identify online resources where I can get help if necessary.	.82 (.79, .85)
Online GW management [g](34)	Find a quiet place Keep track of what remains to be done Plan ahead Stop GW to surf the Internet [h] Tell my group members to calm down	.92 (.90, .93)

Note. GW = groupwork. All the ratings were based on student survey.
The 95% confidence intervals (CI) for coefficient alpha were calculated using a method employing the central F distribution (see Fan & Thompson, 2001).
[a]Rating: 1 (*none*), 2 (*some*), 3 (*about half*), 4 (*most*), and 5 (*all*).
[b]Rating: 1 (*strongly disagree*), 2 (*disagree*), 3 (*agree*), and 4 (*strongly agree*).
[c]Rating: 1 (*strongly disagree*), 2 (*disagree*), 3 (*neither agree nor agree*), 4 (*agree*), and 5 (*strongly agree*).
[d]Rating: 1 (*much lower than*), 2 (*lower than*), 3 (*about the same as*), 4 (*higher than*), and 5 (*much higher than*).
[e]Rating: 1 (*much worse than*), 2 (*worse than*), 3 (*about the same as*), 4 (*better than*), and 5 (*much better than*).
[f]Rating: 1 (*not at all true of me*) to 7 (*very true of me*).
[g]Rating: 1 (*never*), 2 (*rarely*), 3 (*sometimes*), 4 (*often*), and 5 (*routinely*).
[h]The item was reverse scored.

Feedback. Based on relevant literature (Trautwein, Koller, Schmitz, & Baumert, 2002; Xu, 2008a), this scale consisted of five items to measure how much groupwork was monitored by group members and the instructor (α = .80; the amount of the groupwork being checked and shared).

Reasons for online groupwork. This scale consisted of two subscales (peer- and learning-oriented reasons), informed by the Homework Purpose Scale (Saban, 2013; Xu, 2010, 2011). Five items assessed learning-oriented reasons (α = .83), with respect to media, technology, and productivity. Four items assessed peer-oriented reasons (α = .78), regarding working and collaborating with group members. Confirmatory factor analysis indicated that this scale consisted of these two related but separate subscales (SRMR = .046; RMSEA =.045; 90% CI = .013, .070; CFI = .973).

Online groupwork interest. This scale consisted of five items to measure students' interest toward online groupwork (α = .94), based on related literature on interest and intrinsic motivation (Wigfield & Eccles, 2000; Xu, 2008a; Xu & Corno, 1998). It measured the extent to which students look forward to online groupwork and to what extent they like groupwork assignments.

Affective attitude. Informed by related literature (Warton, 2001; Xu, 2008a), this scale consisted of four items to measure the favorability of online groupwork (e.g., students' motivation, attention, and moods; α = .86).

Help seeking. This scale incorporated seven items to measure students' effort for help seeking in the online groupwork process (α = .82), informed by and adapted from relevant items from the Motivated Strategies for Learning Questionnaire (Duncan & McKeachie, 2005).

Online groupwork management. As the outcome variable of our research in this study, this scale was developed from related literature (Corno, 2004; Corno & Xu, 2004; Xu, 2008b, 2008c; Xu & Corno, 2003). It consisted of 34 items (*α* = .92), including managing time, handling distraction, arranging the environment, controlling emotion, and monitoring motivation (see sample items in Table 1).

Statistical modeling analyses

As we had nested data structure (individuals nested under groups), we used multi-level modeling analysis to appropriately take care of a number of major issues (e.g., heterogeneity of regression and misestimated standard errors) introduced by the nested data structure. Multilevel modeling can include variables at different levels, by taking into consideration the nonindependence of observations (Raudenbush & Bryk, 2002).

In the current study, multilevel analyses were performed using the HLM 6. To help interpret the resulting regression coefficients, we first standardized all continuous variables (*M* = 0, *SD* = 1) prior to conducting the multilevel analyses. As a result, the regression weights for all variables (except the dummy-coded variables) were largely equivalent with the standardized weights from multiple-regression procedures (Xu, 2008a).

Model 1 included ten student-level variables, while no group-level predictors were used. These variables included student characteristics (gender, age, previous online courses, and student status), feedback, peer- and learning-oriented reasons, online groupwork interest, affective attitude, and help seeking. We hypothesized that groupwork management was positively associated with feedback, peer- and learning-oriented reasons, online groupwork interest, helping seeking, and affective attitude. These hypotheses were informed by self-regulation literature that students' management in groupwork may be affected by task value, task interest, affective attitude, feedback, and help seeking (Garcia et al., 1998; Pintrich, 2004; Pintrich & Zusho, 2002; Schunk, 2005). In addition, these hypotheses were consistent with empirical findings that secondary students' homework management was positively related to feedback, homework purpose, homework interest, and affective attitude toward homework (Xu & Wu, 2013). Student characteristics (e.g., age and gender) were included in the model for statistically controlling for these characteristics in our study.

Model 2 incorporated additional four variables at the group level (i.e., online groupwork interest, affective attitude, feedback, and help seeking). Each group-level variable was based on the aggregation of the variable within a group to the group level to build an index of the shared perception (e.g., shared groupwork interest). The main reason for including these group-level variables was based on the consideration that the use of regulation strategies could be influenced by academic and social environments (Corno & Mandinach, 2004), including values, norms, and expectations concerning feedback, help seeking, and affective engagement in online groupwork. For example, students' shared feedback in a given group could have an effect on online groupwork management over and above the effect of feedback at the individual level.

Our models implemented in the present study were random-intercept models (Raudenbush & Bryk, 2002), in that the intercept of these models was considered random to reflect between-group differences in online groupwork management. We did not estimate the random parts of the slopes, since we had no *a priori* hypotheses regarding between-group differences in the predictive power of the predictor variables. Full maximum likelihood was applied in all models. We centered four group-level variables (help seeking, feedback, online groupwork interest, and

affective attitude) at the group mean, in order to separate compositional and individual effects (Raudenbush & Bryk, 2002).

Results

Table 2 includes the descriptive statistics with respect to all independent variables and the outcome variable of groupwork management. In addition, it includes Pearson correlations among all of the study variables. Groupwork management was significantly related to all of the independent variables.

Table 2. Descriptive statistics and Pearson correlations

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender (male: 1)	.44	.50	---													
2. Full-time student (yes: 1)	.77	.42	.36†	---												
3. Age (<=30: 0, > 30: 1)	.33	.47	-.35†	-.50†	---											
4. Previous online courses	2.27	1.55	-.29†	-.21†	.17†	---										
5. Feedback	3.25	.90	-.27†	-.23†	.23†	.27†	---									
6. Peer-oriented reasons	2.97	.53	-.13*	-.13*	.22†	.20†	.51†	---								
7. Learning-oriented reasons	2.91	.60	-10	-.03	.03	.23†	.45†	.63†	---							
8. Online GW interest	3.11	.97	-.14*	-.15†	.07	.20†	.36†	.36†	.49†	---						
9. Affective attitude	2.98	.80	-.10	-.20†	.06	.05	.25†	.36†	.42†	.78†	---					
10. Help seeking	4.91	1.04	-.03	-.09	-.01	-.05	.14*	.26†	.23†	.23†	.31†	---				
11. Feedback (group)[a]	3.28	.61	-.21†	-.25†	.26†	.38†	.66†	.41†	.35†	.25†	.17†	.10	---			
12.Online GW interest (group)[a]	3.13	.59	-.10	-.15†	.06	.30†	.27†	.17†	.25†	.60†	.46†	.07	.42†	---		
13. Affective attitude (group)[a]	3.00	.51	-.11	-.17†	.09	.14*	.20†	.25†	.24†	.45†	.61†	.16†	.31†	.75†	---	
14. Help seeking (group)[a]	4.91	.63	-.06	-.14*	.03	-.02	.11	.25†	.13*	.09	.18†	.58†	.17†	.14*	.30†	---
15. Online GW management	3.58	.55	-.21†	-.12*	.23†	.28†	.55†	.58†	.52†	.35†	.28†	.37†	.38†	.16†	.14*	.26†

Note. GW = groupwork. $N = 298$.

[a]The aggregation of the variable within a group to form an index of the shared view at the group level (e.g., shared feedback). The fully unconditional model showed that most of the variance occurred at the individual level, with 14.0% of the variance in online groupwork management occurred at the group level. For this model, the deviance statistics and the associated number of estimated parameters were 837.98 and 3. $^{*}p < .05$. $\dagger p < .01$.

Model 1 with ten student-level variables had deviance statistics and the associated number of estimated parameters being 639.53 and 13. We used the likelihood ratio test to compare Model 1 (i.e., with ten student level-variables) to the fully unconditional model (i.e., without ten student-level variables). As hypothesized, the result showed that Model 1 provided a statistically significantly better fit than the fully unconditional model ($\chi^2_{(df = 10)} = 198.45$; $p < .001$). Model 1 (i.e., with ten student-level variables) explained 43.88% of the variance in groupwork management at the individual level, and explained 72.88% of the variance in groupwork management at the group level (see Table 3).

Model 2 consisted of four group-level variables (feedback, help seeking, online groupwork interest, and affective attitude). For this model, the deviance statistics and the associated number of estimated parameters were 612.66 and 17. We used the likelihood ratio test to compare Model 2 (i.e., with four-group level variables) to Model 1 (i.e., without four-group level variables). As hypothesized, the result showed that Model 2 provided a statistically significantly better fit than Model 1 ($\chi^2_{(df=4)} = 26.87$, $p < .001$). Data further indicated that Model 2 explained an additional 1.22% of the variance in online groupwork management at the individual level as well as an additional 27.08% of the variance in online groupwork management at the group level.

Taken together, Model 2 accounted for 45.10% of the student-level variance in groupwork management, 99.96% of the group-level variance, and 52.79% of the total variance. As indicated in Table 3, groupwork management was positively associated with feedback ($b = .32$, $p < .01$), peer-oriented reasons ($b = .22$, $p < .01$), help seeking ($b = .21$, $p < .01$), learning-oriented reasons ($b = .17$, $p < .05$), and the number of previous online courses ($b = .15$, $p < .01$). In addition, those students who were over 30 years old (compared with those students who were 30 and below) reported

more frequently working to manage online groupwork (b = .30, p < .05). Finally, groupwork management was positively associated with two group-level variables: help seeking (b = .32, p < .01) and feedback (b = .23, p < .05).

Table 3. Online groupwork management: Results from multilevel modeling

Model predictor	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Student level				
Gender (female: 0, male: 1)	-.07	.12	-.04	.11
Full-time student (no: 0, yes: 1)	.13	.14	.23	.14
Age (<=30: 0, >30: 1)	.30*	.13	.30*	.13
N of previous online courses	.16†	.05	.15†	.04
Feedback	.29†	.07	.32†	.08
Peer-oriented reasons	.28†	.06	.22†	.06
Learning-oriented reasons	.19†	.07	.17*	.07
Online groupwork interest	.01	.08	.03	.08
Affective attitude	.03	.09	.04	.09
Help seeking	.21†	.06	.21†	.06
Group level				
Feedback			.23*	.09
Online groupwork interest			.04	.09
Affective attitude			-.17	.10
Help seeking			.32†	.08
Variance explained at the student level	43.88%		45.10%	
Variance explained at the group level	72.88%		99.96%	
Total variance explained	47.95%		52.79%	
Model deviance	639.53		612.66	
Number of estimated parameters	13		17	

Note. N = 298 students from 86 online groups. b = unstandardized regression coefficient. *SE* = standard error of b. Likelihood-ratio tests that compare models can be calculated when one compares differences in model deviance values with degrees of freedom equal to differences in number of estimated parameters. *p < .05. †p < .01.

Discussion

Our study examined empirical models of variables to predict groupwork management in online collaborative learning environments. Data indicated that six student-level variables explained the variance in online groupwork management (i.e., age, previous online courses, peer- and learning-oriented reasons, feedback, and help seeking). At the group level, online groupwork management was positively associated with feedback and help seeking.

How do we explain the finding that groupwork management was positively associated with previous online courses? Whereas Barnard-Brak, Paton, and Lan (2010) did not find any difference in self-regulatory skills (e.g., environmental structuring and time management) over students' first semester of online learning, they hypothesized that one semester may not be long enough to assess significance difference in this area. While in line with their hypothesis, our study further suggests that it may take time for self-regulatory strategies to develop in online learning environments.

The finding relating to age difference is consistent with previous finding (Cooper & Corpus 2009) that adults (ranging in age from 18 to 22) demonstrated more knowledge of the effectiveness of strategies for sustaining motivation that did fifth graders. Thus, the present study expands previous research, by suggesting that older adults (ranging from 31 to 60) are more likely to manage groupwork than do younger adults (being 30 years or below) in online collaborative learning environments.

These findings (i.e., relating to the differences by age and online courses) suggest that instructors need to pay special attention to those students who are younger and with less online learning experience, to help them to better manage online groupwork. This may include (a) sharing effective online groupwork management strategies (e.g., arranging a

conductive online study environments) and (b) encouraging them to learn from peers (e.g., older students and those with more online experiences) and to monitor their use of groupwork management strategies.

Our findings that groupwork management was positively related to help seeking and feedback are consistent with the self-regulation literature (Corno, 2004; Pintrich, 2004; Wolters, 2011) and previous findings on students' homework management (Xu & Wu, 2013). In addition, our study extends previous research in the field, by revealing that help seeking and feedback in a given group had positive effects on groupwork management in addition to their positive effects at the individual level. These findings suggest that feedback and help seeking provide students with added incentive and willingness (in the constant presence of the supportive instructor and group members) to exert efforts to regulate their groupwork in online collaborative learning settings.

A recent literature review on formative feedback suggests that uncertainty can interfere with task performance, whereas decreasing uncertainty through formative feedback can enhance motivation and contribute to more effective task management strategies (Shute, 2008). As ones activities are less visible to peers in online environments (An, Kim, & Kim, 2008), a student may experience a higher level of uncertainty in the online groupwork process. Thus, it is not surprising that feedback has a more important role in leading to effective task management strategies, with online groupwork management strategies in particular (e.g., accessing group members and organizing around their schedule). This is, to some extent, substantiated by recent qualitative findings regarding the importance of feedback (e.g., sharing and expanding relevant ideas) in following through online group projects (Biasutti & El-Deghaidy, 2012; Ku et al., 2013). Thus, it would be desirable to promote a norm of providing ongoing feedback among the instructor and group members, such as providing constructive comments of each others' progresses and offering timely suggestions to prevent group members from going off course.

Similarly, it would be beneficial to develop and foster a norm of help seeking, to encourage online students to seek help from various sources (e.g., group members and online sources) through various channels (e.g., discussion board and web chat), ranging from clarifying groupwork expectations to offering suggestions about how to better approach certain aspects of groupwork. Furthermore, as online students may use Web-based helpers as well as peers' online discussions and submissions to plan their work and monitor their progress (Whipp & Chiarelli, 2004), it would be beneficial to promote a norm of encouraging students to take advantage of this unique form of help seeking in Web-based learning environments, a form of help seeking that is more readily accessible and relatively less obtrusive.

Consistent with the theoretical claim regarding the important role of goals and task importance on self-regulation (Pintrich, 2004), our study takes another step forward, by showing that peer- and learning-oriented reasons were positively associated with online groupwork management. Thus, our study extends previous research concerning the importance of goals in self-regulation from individual-oriented tasks in face-to-face environments (e.g., Pintrich & Zusho, 2002; Xu & Wu, 2013) to group-oriented tasks in online learning environments. Consequently, it would be helpful for instructors to develop online collaborative activities to engage online students. Furthermore, as online groupwork requires positive interdependence among group members (Nam & Zellner, 2011), it would be valuable to foster group cohesiveness in the progress. It would also be helpful to promote a norm of sharing exemplary groupwork management strategies with peers, so that they can learn with and from each other about how to better manage the challenges associated with online groupwork.

Meanwhile, how do we make out of the findings that online groupwork management was not associated with interest and affective attitude toward online groupwork? These findings are not in line with (a) the theoretical claim regarding the role of task interest on self-regulation (Garcia et al., 1998; Pintrich & Zusho, 2002) and (b) previous findings relating to secondary students' homework management (Xu & Wu, 2013). One possible explanation is that, for graduate students in our study, task importance (compared with task interest) may play a more central role in their online collaborative learning environments. This is an important hypothesis to be examined in future investigation. This hypothesis is, to some extent, substantiated by the observation that children's involvement in different activities may be based more on their interest in the activity rather than its usefulness (Wigfield, Tonks, & Eccles, 2004). It is further consistent with the findings that, for undergraduate students, task-specific importance (compared with task-specific interest) played a more significant role in test-taking effort (Cole, Bergin, & Whittaker, 2008).

It is important to state that our findings were derived from a relatively large sample of students, using multilevel analyses. On the other hand, it has some limitations that need to be acknowledged. One limitation is that the present study was based on self-report. Another limitation is that our research design was correlational. Whereas feedback,

help seeking, peer- and learning oriented reasons were found to predict online groupwork management, these variables were not manipulated. Consequently, it would be informative for future research to manipulate some of these variables and to examine the influences of these manipulations on subsequent online groupwork management.

It would be important to carry out longitudinal studies to investigate how students manage online groupwork over time, and how groupwork management is affected by various variables at the individual and group levels. In addition, although several studies on online groupwork implied that groupwork management in online environments had a positive influence on groupwork performance (Choi & Kang, 2010; Koh & Hill, 2009; Oliveira, Tinoca, & Pereira, 2011), there is a need to more explicitly link groupwork management to quality of groupwork in a longitudinal design.

There is also a need to conduct studies such as this with younger learners (e.g., secondary school and undergraduate learners), as findings from the present study and related findings on secondary homework (Xu & Wu, 2013) suggest that the relative influence of task importance, interest, and appeal on management strategies may be moderated by students' age. Furthermore, it would be informative to examine how students manage online groupwork in a shared document platform, as the use of such a platform may influence how students approach online groupwork (e.g., feedback and help seeking). Finally, it would be valuable to open a new line of investigation to better understand and address the challenges associated with online group management in cross-cultural environments, because one's attitudes toward online groupwork (e.g., perceived importance of doing online groupwork) may be influenced by cultural differences regarding the value of individual autonomy and choice (Eccles, 2005) and of the value structure of individualism and collectivism (Hofstede, 2001).

Conclusion

One research area increasingly gaining importance in the field of online collaborative learning is relating to students' groupwork management (Choi & Kang, 2010; Rovai, 2007; Smith et al., 2011; Volet et al., 2009). The present investigation examined multilevel models of factors to predict online groupwork management, informed by the self-regulation literature and studies pertaining to online groupwork management.

Results revealed that, at the student level, online groupwork management was positively associated with previous online courses, feedback, peer- and learning-oriented reasons, and help seeking. In addition, older students more frequently took initiatives to manage online groupwork. Finally, groupwork management was positively related to help seeking and feedback at the group level.

In light of the lack of empirical research investigating a broad range of variables that contribute to groupwork management at the individual and group level, it can be argued that the present investigation expands and extends previous research on online collaborative learning (e.g., the importance of help seeking and feedback at both the student and group level). We hope that that our findings are of considerable importance and utility to academic researchers and online instructors who are interested in online collaborative learning, with online groupwork in particular.

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