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Factors Related to Cognitive, Emotional, and Behavioral Engagement in the Online Asynchronous Classroom

Maura Pilotti, Stephanie Anderson, Pamela Hardy,
Pamela Murphy, and Pamela Vincent
Ashford University

The purpose of this investigation was to examine the relationships among measures of student engagement, instructor engagement, student performance, and properties of the online classroom. The authors assessed behavioral, cognitive, and emotional engagement of students and instructors in asynchronous discussion forums and collected measures of student performance (e.g., class completion and discussion forums' grades) as well as properties of the online classroom (e.g., class size and depth of discussion prompts). Quantitative analyses on conduct exhibited by instructors and students in discussion forums from 303 online classrooms in a variety of disciplines revealed a positive association of students' cognitive engagement and instructors' behavioral engagement with the depth of the discussion prompts. Both cognitive and behavioral measures of students' engagement decreased with increased class size. For instructors, as class size increased, behavioral engagement decreased, and cognitive engagement increased. Grades improved with students' emotional engagement but declined with instructors' cognitive engagement. These idiosyncratic patterns of relationships suggest the need for further inquiry into the unique aspects of instruction in the asynchronous online classroom.

In classrooms around the world, engagement refers to the investment of resources (i.e., time and effort) that either students or instructors make to optimize the experience of learning and enhance learning outcomes (Kuh, 2003, 2009; Trowler, 2010). Several studies have found that students' engagement is related to students' satisfaction, persistence, and academic achievement (see Booliger & Wasilik, 2009; Carini, Kuh, & Klein, 2006; Trowler, 2010). Although less attention has been given to instructors' engagement, the latter is often linked not only to students' engagement, but also to instructors' satisfaction, pedagogical success, and persistence in the teaching profession (Betts, 2014; Umbach, & Wawrzynski, 2005). These are all factors that contribute to the sustainability of academic programs. In light of the challenges that higher education institutions are increasingly facing to retain students and ensure not only the acquisition of relevant knowledge and skills, but also comfort and satisfaction with the experience of learning specialized materials, engagement may be the phenomenon that can make both goals possible.

The widespread nature of online learning (Murray, Pérez, Geist, & Hedrick, 2012) has brought to the forefront the need to determine the extent to which engagement is related to students' performance (i.e., outcome measures) and to specific aspects of the online classroom (i.e., potential antecedents shaping educational practices). Although data exist, they often refer to unique small samples of classes and students and/or to less than uniform operational definitions of engagement. Furthermore, they are split between two modes of instruction, synchronous and asynchronous. The former offers both students and instructors the opportunity for real-time (i.e., live) interactions in discussion and/or lecture forums, thereby capturing a key aspect of the traditional classroom, whereas the latter relies heavily on delayed social exchanges. The asynchronous mode allows students to complete work at their own convenience and submit it to a discussion forum or assignment drop box by a required due date. Thus, in contrast to synchronous discussion and lecture forums, where learning is based on immediate reactions to the presented material and ongoing discussion, asynchronous forums invite active reflection and analysis prior to the action of producing a response (Bates, 1997; Gilbert & Dabbagh, 2005; Petty & Farinde, 2013). As such, they emphasize more heavily the role of the instructor as a facilitator of learning, a purportedly less visible role than the one performed by the instructor in both traditional and synchronous online classrooms (Dennen, Darabi, & Smith, 2007; Schellens, Van Keer, & Valcke, 2005). Interestingly, in the synchronous online environment, evidence exists that interactions with instructors in discussion forums are related to students' satisfaction and participation (McBrien, Jones, & Cheng, 2009). However, in the asynchronous online environment, where students can access class materials at any time, questions exist on the nature of student-instructor interactions and on their potential impact on engagement (Hew, Cheung, & Ng, 2010).

The Present Study

Although questions exist regarding the influence of the asynchronous mode of instruction on engagement, little or no evidence exists of its impact in quality-assured classrooms where key aspects of the curriculum,

presentation, and instruction not only are uniform across sections of the same course (Boston, Ice, & Gibson, 2011; Legon, 2006), but also have been reviewed and judged by independent subject-matter and education experts as promoting learning (Coffman & Klinger, 2013). Quality-assured classrooms offer unique opportunities for studying engagement as they largely eliminate the variability (i.e., noise) related to the distinctive characteristics of the instructor's selected material and presentation across different sections of the same course. They also rely on activities (e.g., discussion forums) that can be found in all courses and sections, thereby making aggregation or comparison of different classes easier. Yet, standardization of course materials and activities may have an undesirable impact on engagement. For instance, it may unintentionally promote the strict adoption of uniform rules of conduct in both students and instructors, thereby concealing evidence of engagement. Thus, the main purpose of the present study was to examine the relationship between engagement measures of students and instructors (Fredricks, Blumenfeld, & Paris, 2004; Kuh, Kinzie, Bridges, & Hayek, 2007) in asynchronous discussion forums of quality-assured classrooms and students' performance measures (e.g., class completion and discussion forum grades), as well as common properties of the online classroom (e.g., class size and depth of discussion prompts). The ancillary purpose was to examine the relationship between measures of engagement of students and instructors in such classrooms.

The predictions tested in the present study relied on the assumption that if the characteristics of the quality-assured asynchronous classroom did not conceal engagement, findings could be expected to illustrate the educational value of engagement and thus replicate those observed in other more traditional types of classrooms (including face-to-face and online synchronous). Based on this assumption, we predicted that students' performance measures (i.e., grades of discussion forums and class completion) would be positively correlated with the engagement exhibited by both students and instructors (Booliger & Wasilik, 2009; Carini et al., 2006). Of course, the possibility that each dimension might contribute to performance differently was examined, although existing evidence did not permit specific predictions regarding the relative contribution of cognitive, emotional, and behavioral engagement to students' performance (Duncan, Kenworthy, & McNamara, 2012; Grier-Reed, Appleton, Rodriguez, Ganuza, & Reschly, 2012).

Furthermore, the prediction that specific properties of the asynchronous classroom, such as depth of discussion prompts and class size, might impact engagement differentially was assessed. Existing evidence suggested that the depth of the discussion prompts might be positively related to cognitive engagement (Robinson, & Hullinger, 2008; Zhu, 2006), whereas class size might be negatively related to behavioral engagement (Kim, 2013; Taft, Perkowski, & Martin, 2011). As students and instructors would be likely to interact with each other in a pattern of mutual influences, we expected engagement of the former to be positively related to engagement in the latter (Nandi, Hamilton, Chang, & Balbo, 2012; Xie, DeBacker, & Ferguson, 2006). Therefore, although dimensions of students' engagement might be expected to be more strongly linked to performance measures and properties of the asynchronous classroom than instructors' dimensions of engagement, we anticipated engagement of both parties not only to mimic the same patterns of variability, but also to be mutually compatible. We tested these predictions following the methodology described below.

Method

Participants

Three hundred and four online asynchronous classes ranging in size from 2 to 31 students (M = 15.26; SD = 6.86) were selected for the study, resulting in 4,639 students and 304 instructors. Four or five sections of the same course taught by different instructors were selected from the pool of available archived sections, and up to four students were randomly selected from each class section. For sections consisting of four or fewer students, all students in the class were included. Courses covered a variety of academic subjects, including business, healthcare, and behavioral and social sciences. Their curriculum was largely predefined in accordance with standards specified by Quality Matters (see Legon, 2006; Willis, 1994; Zygouris-Coe, Swan, & Ireland, 2009). Such standards are assumed to ensure optimal, evidence-based learning conditions in key aspects of the curriculum and instruction of a course, such as course overview, learning objectives, assessment, instructional materials and resources, course activities, learner interaction, technology, learner support, and accessibility and usability of tools and materials (Shattuck, Zimmerman, & Adair, 2014). The structural frame of each section of a course included the following weekly responsibilities on the part of the instructor: offer a lecture in the form of a document and/or video, serve as an interactive facilitator in discussion forums, and provide feedback on students' discussion posts and written assignments. Additionally, during the first week of each class, the instructor was required to respond to each student's introduction in a forum specifically devoted to this purpose.

Materials and Procedures

For each section of a selected class, key properties of the online classroom (i.e., class size and depth of discussion prompts), students' performance (i.e., class

completion rates and discussion forum grades), and measures of behavioral, cognitive, and emotional engagement were collected (see Table 1 for a summary of the variables used).

The online classroom. Key properties of the online classroom included class size and depth of discussion prompts as determined by the six levels of the Bloom's Taxonomy (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956).

Students' performance. Students' performance included class completion rates (i.e., the proportion of students who completed a class over the number of students who attended during the first week) and discussion forum grades.

Engagement. According to Fredricks and colleagues (2004), engagement is characterized by three dimensions: behavioral (e.g., compliance with attendance and involvement), cognitive (e.g., investment in one's activities and appreciation of challenges), and emotional (e.g., positive affective reactions, including enjoyment and sense of belonging). In the present study, key aspects of each dimension were translated into indices that could be observed and measured in the online classroom.

Behavioral engagement. A key aspect of behavioral engagement is involvement (Fredricks et al., 2004). As a result, two indices of involvement were selected: response rates in discussion forums and length of discussion posts. For both students and instructors, response rates in discussion forums (i.e., average number of posts per student or instructor) and length of discussion posts (i.e., the average number of words in posts) served as measures of behavioral engagement (i.e., participation).

Emotional engagement. Emotional engagement is an overall positive affective reaction to the class, including enjoyment and sense of belonging (Fredricks et al., 2004). To capture this definition, two indices were identified: frequency of self-referential notes (e.g., I, we, etc.) relative to the number of words in posts, and overall connotation of posts (as determined by the difference between positive and negative words used).

Cognitive engagement. According to Fredricks and colleagues (2004) and Pintrich (2003), cognitive engagement is investment in one's activities. To assess

Table 1
Descriptive Statistics

Measure	*M*	*SD*	Scale	*n*
Properties of the online classroom				
Class size	15.260	6.861		304
Depth of discussion prompts	3.658	1.343	1-6	304
Instructors				
Behavioral engagement				
Response rate	0.212	0.120		304
Length of discussion posts (i.e., number of words)	75.318	50.205		303
Cognitive engagement				
Depth of posts	2.248	1.076	1-6	304
Lexical density of posts	78.765	9.828	0-100	303
Emotional engagement				
Frequency of self-referential quotes in posts	0.005	0.006	0-1	303
Connotation of posts	3.944	3.309		304
Students				
Behavioral engagement				
Response rate	3.480	0.543		304
Length of discussion posts (i.e., number of words)	349.381	123.334		304
Cognitive engagement				
Depth of posts	3.153	0.993	1-6	304
Lexical density of posts	55.245	10.773	0-100	304
Emotional engagement				
Frequency of self-referential quotes in posts	0.011	0.012	0-1	304
Connotation of posts	1.788	2.391		304
Performance				
Class completion rates	0.906	0.090	0-1	304
Grades of discussion forums	4.303	0.581	1-5	304

Table 2

Pearson Correlations

	PC:CS	PC:DP	IB:RR	IB:LP	IC:DP	IC:LD	IE:SR	IE:PN	SB:RR	SB:LP	SC:DP	SC:LD	SE:SR	SE:PN	S:CC	S:DG
PC:CS	1															
PC:DP	-.249**	1														
IB:RR	-.312**	.144*	1													
IB:LP	-.013	.019	-.053	1												
IC:DP	.230**	.074	-.075	.503**	1											
IC:LD	.059	-.015	.077	-.855**	-.509**	1										
IE:SR	.131*	.035	-.149**	.302**	.246**	-.288**	1									
IE:PN	-.043	-.020	.045	-.285**	-.278**	.279**	-.092	1								
SB:RR	-.189**	.075	.062	-.045	-.042	.062	.003	-.113*	1							
SB:LP	-.126*	.018	-.002	.110	-.033	-.095	-.219**	-.050	.112	1						
SC:DP	-.144*	.435**	-.024	.048	-.023	.014	-.030	.021	.101	.313**	1					
SC:LD	.052	-.002	.018	.025	.019	.029	.058	-.017	-.027	-.401**	-.138*	1				
SE:SR	-.019	.098	-.067	.037	.004	-.027	.192**	.029	.035	-.091	.085	-.019	1			
SE:PN	.041	.006	-.034	-.136*	-.075	.117*	-.045	.256**	-.108	-.094	-.092	.127*	-.168**	1		
S:CC	.088	.031	-.056	-.061	-.042	.005	.021	-.060	.013	-.069	.104	.062	.008	.013	1	
S:DG	.160*	-.084	-.005	.061	-.160**	-.015	.012	.039	.023	.016	-.077	.063	.139*	-.068	.011	1

** Correlation is significant at the .01 level (2-tailed)

* Correlation is significant at the .05 level (2-tailed)

Listwise n = 303

Key: PC = Properties of the online classroom; I = Instructor; S = Students; B = Behavioral engagement; C = Cognitive engagement; E = Emotional engagement; CS = Class size; DP = Depth of discussion prompts or posts; RR = Response rate; LP = Length of posts; LD = Lexical density; SR = Frequency of self-referential quotes; PN = Positive or negative connotation of posts; CC = Class completion rate; DG = Discussion forum grade

this factor, the depth of posts in discussion forums and their lexical density (i.e., the number of different words relative to the total number of words) were utilized. Depth was evaluated according to Bloom's taxonomy (Bloom et al., 1956; Zhu, 2006). Lexical density, which measures the difficulty of reading text, was computed by dividing the number of different words by the total number of words, and then multiplying the obtained value by 100. The easier a text is to read, the lower its lexical density.

Results

Descriptive statistics regarding the variables examined in the present study are reported in Table 1. Due to some missing data in one record, most variables have a sample size 304, while a few have 303 cases. As indicated earlier, the purpose of the present study was to examine the relationships among measures of behavioral, cognitive, and emotional engagement (Fredricks et al., 2004; Kuh et al., 2007) of students and instructors in asynchronous discussion forums and students' performance as well as properties of the online classroom. Pearson correlations were calculated for the set of variables described above using listwise deletion, yielding a uniform sample size of 303 class sections. The complete correlation matrix is provided in Table 2, and significant correlations are reported below. All significance tests were two-tailed.

Properties of the Online Classroom

The selected properties of the classroom were correlated with specific types of engagement. For instance, the depth of the prompts of discussion forums was positively related to students' cognitive engagement (depth of posts, $r = .435$, $p < .01$) and faculty's behavioral engagement (response rate, $r = .144$, $p < .05$).

For students, increases in class size were accompanied by decreases in behavioral engagement (response rate, $r = -.189$, $p < .01$, and length of discussion posts, $r = -.126$, $p < .05$) and cognitive engagement (depth of posts, $r = -.144$, $p < .05$). For instructors, cognitive engagement increased (depth of posts, $r = .230$, $p < .01$), one measure of emotional engagement increased (frequency of self-references, $r = .131$, $p < .05$), and behavioral engagement decreased (response rate, $r = -.312$, $p < .01$) as class size increased. There was a negative correlation between the class size and the depth of the discussion prompt ($r = -.249$, $p < .01$).

Measures of Students' Performance

Measures of students' performance produced a different pattern of results. Class completion rates were not related to measures of engagement, yet discussion forum grades correlated positively with students' emotional engagement (self-references, $r = .139$, $p < .05$) while grades had a negative correlation with instructors' cognitive engagement (depth of posts, $r = -.160$, $p < .01$). There was a positive correlation between class size and discussion grades ($r = .160$, $p < .05$).

Measures of Engagement of Students and Instructors

Emotional engagement in students and instructors tended to be positively correlated (frequency of self-referential quotes: $r = .192$, $p < .01$; connotation of posts: $r = .256$, $p < .01$). Students' emotional engagement (as measured by the positive connotation of posts) improved as the lexical density of instructors' posts increased ($r = .117$, $p < .05$). However, there was a negative correlation between the emotional connotation of students' posts and the instructors' behavioral engagement measure of length of posts ($r = -.136$, $p < .05$). Instructors' emotional engagement, as measured by frequency of self-references, was negatively associated with the length of students' discussion posts ($r = -.219$, $p < .01$). The correlation between students' response rate and instructors' connotation of posts was also negative ($r = -.113$, $p < .05$).

The strongest correlations among the variables examined in this study were between different measures of engagement of instructors. There were also several significant correlations between different measures of students' engagement. For instance, the correlation between lexical density (cognitive) and length of posts (behavioral) was negative for both instructors ($r = -.855$, $p < .01$) and students ($r = -.401$, $p < .01$). An inverse relationship between lexical density and depth of posts (both cognitive measures of engagement) was also observed for instructors ($r = -.509$, $p < .01$) and students ($r = -.138$, $p < .05$). Other significant correlations with instructors' lexical density were the instructors' emotional engagement measures of frequency of self-references ($r = -.288$, $p < .01$) and connotation of posts ($r = .279$, $p < .01$). For students, the correlation between lexical density and connotation of posts was positive ($r = .127$, $p < .05$).

Depth of instructors' posts was associated positively with instructors' emotional engagement, as measured by the frequency of instructors' self-references ($r = .246$, $p < .01$), but negatively with the instructors' emotional engagement measure of connotation of posts ($r = -.278$, $p < .01$). Positive correlations were observed between behavioral length of posts and cognitive depth of posts for both students ($r = .313$, $p < .01$) and instructors ($r = .503$, $p < .01$). Other significant correlations that appeared for instructors, but not for students, were a negative association between response rate and frequency of

self-references (r = -.149, p < .01), a positive relationship between length of posts and frequency of self-references (r = .302, p < .01), and a negative association between length of posts and connotation of posts (r = -.278, p < .01). Finally, for emotional engagement, frequency of self-references and positive connation of posts were negatively correlated for students (r = -.168, p < .01), but this relationship was not significant for instructors.

Discussion

The results presented above can be summarized in five points. First, the positive correlations between depth of the discussion prompt and measures of engagement (i.e., students' cognitive engagement and faculty's behavioral engagement) suggest that both students and instructors may respond well to high pedagogical expectations. Second, the pattern of relationships involving class size suggests that instructors may be more cognitively engaged in larger classes, perhaps as a means of counteracting their concerns regarding learning and/or their reduced behavioral engagement in such classes. Instead, students' responses to larger classes seem to be more uniform, including declines in both behavioral and cognitive engagement. Third, the fact that students who are performing well in a class may express their comfort by using a more personal tone (as indicated by the positive relationship between use of self-references and grades) is not surprising. It is also not surprising that instructors' cognitive engagement (as measured by depth of posts) is inversely related to discussion grades. This may suggest that instructors who are more cognitively engaged have more discriminating grading practices. It supports the commonly held view that increased focus on content accompanies "tough graders." Fourth, the concurrent increase in students' emotional engagement (as measured by the positive connotation of posts) and instructors' cognitive engagement (as measured by lexical density) is open to two possible interpretations. It is possible that an instructor's well-articulated posts lead students to feel appreciation for the challenges offered by the instructor's writing. Alternatively, students who express their appreciation of the discussion forum activity in their post may lead the instructor to be more cognitively engaged in his/her responses. Of course, a correlational study such as ours cannot offer a test for assumptions involving cause-effect relationships. Fifth, the declines in students' behavioral engagement (as measured by the length of discussion posts) with increases in instructors' use of self-referential quotes also entertain two feasible interpretations. Namely, it is possible that an instructor's enhanced self-focus may discourage students from further developing the narratives of their posts. Alternatively, the instructor's response to minimal posts may be to offer more self-referential information in hopes of increasing students' output. Although in our correlational study these cause-effect relationships cannot be directly tested, it is reasonable to interpret the emotional engagement experienced by students and instructor as mutually reinforcing (as demonstrated by the use of self-referential quotes and words with a positive connotation). However, the fact that less emotional engagement in students is accompanied by longer narratives posted by the instructor appears to tell a different story. It is entirely possible that the instructor responds to students' weak engagement by writing longer posts in hopes of introducing a helpful model. It is also possible that longer posts by instructors are perceived by students as creating unattainable standards, thereby leading to discouragement and/or disengagement.

Did the findings of analyses conducted on the quality-assured asynchronous classrooms of the present study replicate those observed in other more traditional types of classrooms (including face-to-face and online synchronous)? We predicted that students' performance measures (i.e., grades of discussion forums and class completion) would be positively correlated with the engagement exhibited by both students and instructors (Booliger & Wasilik, 2009; Carini et al., 2006). We found either no relationship or a more complex one than expected. In fact, class completion rates were not significantly related to engagement, whereas grades increased with students' emotional engagement and decreased with instructors' cognitive engagement.

Interestingly, the prediction that specific properties of the asynchronous classroom, such as depth of discussion prompts and class size, might impact engagement differentially found more support. In fact, class size was found to be negatively related not only to behavioral engagement (Kim, 2013; Taft et al., 2011) of both students and instructors, but also to students' cognitive engagement. Contrary to expectations, instructors' cognitive and emotional engagement was found to increase with class size, indicating that instructors' responses to the number of students in class were more diverse than those of students, perhaps because instructors recognized class size as a problem that is to be addressed. The present data, however, did not warrant reliable conclusions regarding the ideal class size for asynchronous online instruction as they represented mere correlations. Data from targeted experimental manipulations of class size could offer evidence of cause-effect relationships and perhaps help researchers and educators identify a

threshold above which adding more students to a class would be unwarranted.

Nevertheless, the prediction that the depth of the discussion prompts would be positively related to students' cognitive engagement (Robinson & Hullinger, 2008; Zhu, 2006) was supported. It was also found that the depth of the discussion prompts was positively related to instructors' behavioral engagement. As students and instructors were expected to interact with each other in a pattern of mutual influences, we predicted that engagement of the former would be positively related to engagement in the latter (Nandi et al., 2012; Xie et al., 2006). Findings regarding the emotional engagement of both parties supported this prediction, but the pattern uncovered was much more complex. Students' emotional engagement was found to increase with instructors' cognitive engagement and decrease with instructors' behavioral engagement, whereas students' behavioral engagement decreased with instructors' emotional engagement.

Although relationships were detected, the magnitude was small for most. It is reasonable to assume that the constraints related to quality-assured curricula and standards of conduct might have weakened the variability of the data set and thus reduced the magnitude of the observed relationships. The relatively small relationships between performance measures and dimensions of engagement (see also Umbach & Wawrzynski, 2005) might also underscore the fact that learning outcomes stem from a variety of sources, of which students' engagement is only one. Nevertheless, distinctive patterns of relationships were observed which encourage further inquiry into the unique aspects of the human dynamics of asynchronous online learning.

In our opinion, the main task of future research is to determine whether the variables contributing to the patterns of relationships uncovered in the present investigation can be described as the causes of specific effects, the effects themselves, or the mere recipients of the influence of a third factor. For instance, the experimental method may be used to manipulate key aspects of the online classroom (e.g., class size) to assess their potentially different effects on the engagement of both students and instructors. If this approach is applied to a variety of subject matters, it may be able to offer valuable information regarding the ideal number of students for asynchronous online classes in general or for asynchronous online classes covering specific subject matters. Future research may also directly examine the extent to which current results can generalize to the synchronous online modality and to face-to-face instruction across the multitude of subject matters that are taught in colleges and universities. Although future research is intended to address the limitations of current research, it is important to recognize that the present findings have implications for the design of curricula in asynchronous classes. The most relevant take-home message of the present study, which also illustrates one of its limitations, is that learning is a complex process shaped by the array of factors and properties that, at any given point in time, characterize the online classroom and the cognitions and actions of its participants (i.e., students and instructors). Thus, immediate measures of performance, such as class grades and completion rates, may be less able to capture the impact of these factors and properties than long-term measures of attitudes towards learning and future performance. For instance, discussion prompts whose cognitive demands approach the top levels of the Bloom's taxonomy can be beneficial to student learning, albeit their impact may not be visible on immediate measures of performance, such as class grades and completion rates, but may redefine students' approach to learning and performance in subsequent classes.

References

Bates, A. W. (1997). The future of educational technology. *Learning Quarterly, 2*, 7-16.

Betts, K. (2014). Factors influencing faculty participation & retention in online & blended education. *Online Journal of Distance Learning Administration, 17*(1), 1.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (Eds.). (1956). *Taxonomy of educational objectives. The classification of educational goals, Handbook I: Cognitive domain.* New York, NY: David McKay Company, Inc.

Booliger, D. U., & Wasilik, O. (2009). Factors influencing faculty satisfaction with online teaching and learning in higher education. *Distance Education, 30*(1), 103-116.

Boston, W. E., Ice, P., & Gibson, A. M. (2011). A review of paradigms for evaluating the quality of online education programs. *Online Journal of Distance Learning Administration, 14*(4).

Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in Higher Education, 47*(1), 1-32. doi: 10.1007/s11162-005-8150-9

Coffman, T., & Klinger, M.B. (2013). Managing quality in online education. In G. Eby & T. Yuzer (Eds.), *Project management approaches for online learning design* (pp. 220-233). Hershey, PA: IGI Global.

Dennen, V. P., Darabi, A. A., & Smith, L. J. (2007). Instructor-learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education, 28*(1), 65-79. doi:10.1080/01587910701305319

Duncan, K., Kenworthy, A., & McNamara, R. (2012). The effect of synchronous and asynchronous participation on students' performance in online accounting courses. *Accounting Education, 21*(4), 431–449.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-109.

Gilbert, P., & Dabbagh, N. (2005). How to structure online discussions for meaningful discourse: A case study. *British Journal of Educational Technology, 36*(1), 5–18.

Grier-Reed, T. L., Appleton, J. J., Rodriguez, M., Ganuza, Z. M., & Reschly, A. (2012). Exploring the student engagement instrument and career perceptions with college students. *Journal of Educational and Developmental Psychology*, *2*(2), 85-96.

Hew, K., Cheung, W., & Ng, C. (2010). Student contribution in asynchronous online discussion: A review of the research and empirical exploration. *Instructional Science, 38*(6), 571–606.

Kim, J. (2013). Influence of group size on students' participation in online discussion forums. *Computers & Education, 62,* 123-129. doi:10.1016/j.compedu.2012.10.025

Kuh, G. D. (2003). What we're learning about student engagement from NSSE. *Change, 35,* 24–31.

Kuh, G. D. (2009). What student affairs professionals need to know about student engagement. *Journal of College Student Development*. *50*(6), 683–706.

Kuh, G. D., Kinzie, J., Bridges, B. K., & Hayek, J. C. (2007). *Piecing together the student success puzzle: Research, propositions, and recommendations*. San Francisco, CA: Jossey-Bass.

Legon, R. (2006). *Comparison of the quality matters rubric to accreditation standards for distance learning.* Baltimore, MD: Quality Matters.

McBrien, J. L., Jones, P., & Cheng, R. (2009). Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning. *International Review of Research in Open & Distance Learning, 10*(3). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/605/1264

Murray, M., Pérez, J., Geist, D., & Hedrick, A. (2012). Student interaction with online course content: Build it and they might come. *Journal of Information Technology Education: Research, 11,* 125-140.

Nandi, D., Hamilton, M., Chang, S., & Balbo, S. (2012). Evaluating quality in online asynchronous interactions between students and discussion facilitators. *Australasian Journal of Educational Technology, 28*(4), 684-702.

Petty, T., & Farinde, A. (2013). Investigating student engagement in an online mathematics course. In R. McBride & M. Searson (Eds.), *Proceedings of the Society for Information Technology & Teacher Education International Conference 2013* (pp. 935–938).

Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology, 95*(4), 667-686. doi:10.1037/0022-0663.95.4.667

Robinson, C. C., & Hullinger, H. (2008). New benchmarks in higher education: Student engagement in online learning. *Journal of Education for Business, 84*(2), 101-109.

Schellens, T., Van Keer, H., & Valcke, M. (2005). The impact of role assignment on knowledge construction in asynchronous discussion groups: A multilevel analysis. *Small Group Research, 36*(6), 704–745. doi:10.1177/1046496405281771

Shattuck, K., Zimmerman, W. A., & Adair, D. (2014). Continuous improvement of the QM Rubric and review processes: Scholarship of integration and application. *Internet Learning, 3(1), 2*5-33.

Taft, S. H., Perkowski, T., & Martin, L. S. (2011). A framework for evaluating class size in online education. *Quarterly Review of Distance Education, 12*(3), 181-197.

Trowler, V. (2010). *Student engagement literature review*. York, UK: Higher Education Academy.

Umbach, P. D., & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in student learning and engagement. *Research in Higher Education, 46*(2), 153-184.

Willis, B. (1994). *Distance education: Strategies and tools*. Englewood Cliffs, NJ: Educational Technology.

Xie, K., DeBacker, T. K., & Ferguson, C. (2006). Extending the traditional classroom through online discussion: The role of student motivation. *Journal of Educational Computing Research, 34*(1), 67–89. doi:10.2190/7bak-egah-3mh1-k7c6

Zhu, E. (2006). Interaction and cognitive engagement: An analysis of four asynchronous online discussions. *Instructional Science, 34,* 451–480.

Zygouris-Coe, V., Swan, B., & Ireland, J. (2009). Online learning and quality assurance. *International Journal on E-Learning, 8*(1), 127–146.

MAURA PILOTTI is a cognitive psychologist who serves as a research analyst at CERTA and a Research Fellow (Social Sciences & Cognitive Neuroscience) at the Forum for Advanced Studies, Gaetano Massa, Roma (Italy). Her

research interests include student learning, memory processes and engagement across the lifespan.

STEPHANIE ANDERSON is a social psychologist who serves as an assistant professor at Ashford University. She currently supervises instruction in social psychology and introductory psychology courses. Her research interests include social dimensions of student learning and retention in the traditional classroom and online.

PAMELA HARDY is a public health expert who serves as the chair of the newly devised master program in public health at Ashford University. Her research interests include the interrelation of curriculum development, dimensions of student engagement and retention.

PAMELA MURPHY is an assistant professor at Ashford University where she supervises instruction in research method courses and chairs the program review committee. Her research interests include student learning and retention.

PAMELA VINCENT is a developmental psychologist who is interested in age-related changes in learning processes across the lifespan.