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College students' engagement and academic outcomes in online learning during the COVID-19 pandemic

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Abstract

This study examined the relationship among motivation, engagement, and academic outcomes in online learning during the COVID-19 pandemic. Participants were 41 students enrolled in at least two online classes. They completed a survey measuring motivation, engagement, and academic performance in their online courses. It was hypothesized that greater motivation and engagement would predict greater academic outcomes, and that engagement mediates the relationship between motivation and academic outcomes. Regression analyses showed that both motivation and engagement significantly predicted academic outcomes. Engagement was not a significant mediator between motivation and academic outcomes; rather, mediation analyses found that motivation mediated the relationship between engagement and academic outcomes. Findings suggest that both motivation and engagement are important for understanding academic outcomes in online courses.

Keywords: Motivation, engagement, academic outcomes, online learning

College Students' Engagement and Academic Outcomes in Online Learning During the COVID-19 Pandemic

Online learning is becoming more and more common. In the Fall of 2019, more than seven million postsecondary students, which was about 37 percent of the total number of postsecondary students in the U.S participated in distance education course(s) (National Center for Education Statistics, n.d.). During the COVID-19 pandemic, online learning increased at a rapid rate due to lockdown and social distancing restrictions that prevented in-person classes. This shift to online learning, coupled with the challenges of the COVID-19 pandemic, has considerably affected instructors, students, and the educational environment. For instance, students have reported increased disruptions to daily functioning (e.g., increased food insecurity), barriers to online learning (e.g., lack of access to necessary technology), and higher levels of anxiety and difficulty concentrating (Lemay et al., 2021). A systematic review of academic achievement during the pandemic revealed a notable learning loss as a result of the transition to online learning (Hammerstein et al., 2021). Evaluating students' experiences of online learning during the COVID-19 pandemic is key in order to help instructors teach and students learn effectively. This study examined student motivation, engagement, and academic outcomes in the context of online learning during the Fall 2020 academic semester.

Literature Review

Motivation

Motivation can be described as the reason for choosing to do or not do something. Motivation also reflects one’s needs and desires (Brophy, 2004). In the context of the classroom, motivation provides energy and gives direction for accomplishment (Pintrich, 2003) and compels students to invest their intention and effort to participate in learning (Brophy, 2004). Educational

research suggests that motivation influences academic achievement and outcomes (Dogan, 2015; Hazrati-Viari et al., 2012; Huang et al., 2014). For instance, one study found that student motivation predicted students' grade point averages (GPA) (Robbins et al., 2004). Notably, a review of 74 experimental studies suggested a relatively robust cause-effect relationship between motivation and academic outcomes, such that greater motivation can be key in achieving greater academic outcomes (Lazowski & Hulleman, 2016).

Importantly, motivation can be distinguished intrinsically and extrinsically (Deckers, 2013). In the context of learning, this means that student motivation can come from both internal factors (e.g., a student is motivated because they enjoy learning) and external factors (e.g., a student is motivated by getting good grades) (Sansone & Harackiewicz, 2000). Intrinsic motivation may be especially important in online classes (Lin et al., 2017). In the context of COVID-19 specifically, one study showed that both intrinsic and extrinsic factors were important for motivation in students' online learning (Gustiani, 2020). However, although some students lacked motivation due to external factors such as internet access issues, students reported intrinsic motivation being particularly important for learning during the pandemic. (Gustiani, 2020).

Previous work has demonstrated the importance of intrinsic values on academic outcomes (Cerasoli et al., 2014; Froiland & Worrell, 2016). In online courses, external motivators may be less salient to students than in-person courses. For instance, in traditional in-person classes, students can receive immediate feedback from instructors that acts as an external reward (e.g., receiving words of encouragement), whereas this type of interaction is less likely to occur in online classes. Indeed, a review by Cerasoli and colleagues (2014) showed that intrinsic motivation is more important when external rewards are less directly tied to performance

outcomes. Therefore, the present research focused on intrinsic motivation—that is, the extent to which students had an intrinsic desire to learn and enjoy learning.

Engagement

According to Dixson (2015), engagement is the way students invest their time and energy in learning. Engagement has multiple components, including an affective component (e.g., how a student feels during the learning process) and a behavioral component (e.g., the effort a student puts toward completing their assigned work) (Skinner et al., 1990). Importantly, students' level of engagement influences their learning and academic outcomes. For example, Handelsman et al. (2005) found that a higher level of engagement among college students in a mathematics class predicted higher grades on weekly class assignments, as well as on midterm and final grades.

The effect of engagement on student performance also extends to online learning environments (Giesbers et al, 2013; Hamm et al., 2019; Poot et al., 2017). Research by Lin and colleagues (2017) found that students' level of engagement with the course content significantly affected positively the students' satisfaction and perceived progress. Similarly, ChanLin (2009) demonstrated that instructor and peer interaction increased student self-confidence and student satisfaction with the course. In research by Poot et al (2017), students who engaged with course content by generating their own potential test questions had higher test scores than students who did not generate test questions, even when controlling for prior knowledge.

Engagement in online learning is affected by the lack of physical presence (Tu & McIsaac, 2002). Platt et al. (2014) found that students perceive that they have less academic interaction in online courses, and they also feel that they learn less than in in-person classes. During the pandemic, students generally agreed that in-person classes helped them more than online classes to increase their engagement in learning (Mali & Lim, 2021). Although online

classes created flexibility for learners' needs, the shift to online classes during COVID-19 impacted students' engagement in their courses, and students paid less attention in class than they did before these classes were shifted online (Garris & Fleck, 2020). Research also found that 25% of students reported that they were unsuccessful regarding their engagement with their online learning classes (Lemay et al., 2021), and at least one third of students could not engage in the online learning due to the lack of supportive learning implements when classes were shifted to online at the start of the COVID-19 pandemic (UNESCO, 2020). Decreased engagement in online classes could have negatively influenced students' academic performance in these classes. Further research investigating engagement and student outcomes in online courses during the COVID-19 pandemic is needed.

Motivation and Engagement

Although motivation and engagement have been shown to have independent effects on student performance, these two constructs are interrelated. In particular, there is evidence that engagement may explain the effect of motivation on academic performance, where greater motivation leads to increased engagement, and increased engagement leads to greater academic performance (Froiland & Worrell, 2016; Xiong et al., 2015). One study examined motivation, engagement, and retention in massive open online courses (MOOC) (Xiong et al., 2015). Results revealed that motivation predicted greater participation (i.e., engagement) in the course, and that engagement predicted course retention, where a higher level of engagement was associated with the greater number of days students stayed in the course (Xiong et al., 2015). Another study on an online college course found that motivation predicted greater participation in online meetings, and that greater participation in the meetings was associated with higher grades on the final exam

(Giesbers et al., 2013). Given these findings, we investigated whether engagement may explain, or mediate, the relationship between motivation and academic outcomes in the present research.

Academic Outcomes

Finally, when examining the relationship between, motivation, engagement, and academic outcomes, various assessment strategies can be used to capture student outcomes. For example, academic outcomes can be measured using more traditional assessments that are intended to more objectively assess whether student learning has occurred, such as the students' grade-point-average (GPA) (Dogan, 2015; Froiland & Worrell, 2016; Hazrati-Viari et al., 2012; Robbins et al., 2004) or grades for assignments or exams (Giesbers et al, 2013; Hamm et al., 2019; Handelsman et al., 2005). In addition to the more traditional assessments of learning, academic outcomes have also been measured based on students' subjective feelings and perceptions of their learning experiences (ChanLin, 2009; Lin et al., 2017). Research on students' academic outcomes during the COVID-19 pandemic has used both traditional assessments like GPA (Basith et al., 2020) and measures of students' subjective experiences with online learning (Lemay et al., 2021). With the goal of learning about student academic outcomes both subjectively and objectively, the current research studied academic outcomes through student GPA and students' subjective outcomes (i.e., perceptions of learning and satisfaction). This approach gave us a broader understanding of student academic outcomes in online learning during the unique circumstance of the COVID-19 pandemic.

The Present Research

The current research investigated how motivation and engagement work together to promote academic outcomes. The topics of motivation and engagement have been widely studied (Lazowski & Hulleman, 2016). However, there has been less focus on how these two variables

work together to promote learning and academic achievement. Past research suggests that student motivation may increase engagement, which then increases academic performance (Xiong et al., 2015). The present research aims to clarify how motivation and engagement work together to predict academic outcomes with online courses. This current study is unique because it examined motivation and engagement in online learning during the COVID-19 pandemic. The pandemic drastically affected the entire educational system, with many classes that previously were traditional, in-person classes moved online. This drastic shift to online learning may have impacted students' level of motivation and engagement and the effects these variables have on each other and on academic outcomes. Given these current circumstances, studying student motivation, engagement, and academic outcomes in online classes is important for understanding how the pandemic affected student learning.

The current study had several predictions. First, it predicted that motivation and engagement would independently influence academic performance, such that greater motivation (H1a) and greater engagement (H1b) predict greater academic outcomes. Second, we predicted that engagement explains the relationship between motivation and academic outcomes. Specifically, we hypothesized that the relationship between motivation and academic performance is mediated by engagement (H2).

Method

Participants

Participants were recruited from a small Midwestern University. There were 41 participants (M_{age} = 20.44, *SD* = 3.35) who were at least 18 years old, including 22 men, 17 women and 2 individuals identifying as non-binary. There were 16 freshmen, 5 sophomores, 13 juniors and 7 seniors.

The participants' majors varied, with majors such as Biology, Environmental Studies, History, Nursing, Chemistry, Mathematics, Graphic Design and Psychology. Among the classes ($M_{\text{total classes}} = 5.33$, $SD = 1.14$) that participants took in the Fall of 2020, eligible student participants were required to have had at least two online classes ($M_{\text{online classes}} = 2.93$, $SD = 1.08$) in the Fall 2020 semester before taking the survey. The participants' average cumulative GPA for online classes was 3.09 ($SD = .87$).

Materials

Motivation

Motivation was measured using eight items from the Intrinsic Value subscale of the Motivated Strategies for Learning Questionnaire (MSLQ), which is a 7-point Likert scale (1 = not at all true of me to 7 = very true of me). The MSLQ was created by Pintrich and DeGroot (1990) and retrieved from PsycTESTS. Example items include: "I prefer class work that is challenging so I can learn new things." Wording in some questions were changed to specifically ask about *online* classes, rather than classes in general. An average motivation score was calculated (Cronbach's $\alpha = .85$), where a higher score indicated greater levels of intrinsic motivation.

Engagement

Engagement was measured using 15 items selected from the online student engagement (OSE) scale (Dixon, 2015). One item was split into two new items to be more specific in measuring engagement with instructor versus student, resulting in a total of 16 items based on the OSE scale. Specifically, "Engaging in conversations online (chat, discussions, email)" was split into "Engaging in conversations online (chat, discussions, email) with the instructor(s)" and "Engaging in conversations online (chat, discussions, email) with other students." The OSE scale

uses a 5-point response scale (1 = Not at all characteristic of me, 2 = Not really characteristic of me, 3 = Moderately characteristic of me, 4 = Characteristic of me, 5 = Very characteristic of me). Items measured engagement including skills engagement, emotional engagement, performance engagement, and participation engagement. The following is an example item: “making sure to study on a regular basis.” Five additional engagement items were created by the researcher to assess participants engagement in online lectures and keeping up with assigned coursework (e.g., “Difficulty concentrating on the online lecture” and “Most of the time, I completed my assignments on time”). The same 5-point response scale was used for these items. An average engagement score was calculated with all 21 items (Cronbach’s α = .91), where a higher score indicated greater level of engagement.

Academic Measures

Finally, the survey included questions created by the researchers to assess academic outcomes in participants’ online classes. This study considered academic outcomes in three distinct categories. First, the average GPA for participants’ online classes was used as an objective, concrete and tangible measure of academic performance. Students reported their grade for each online class, and the researchers used those grades to calculate an average online GPA on a 4.00 scale for each participant. Second, we measured student perceptions of their learning with two questions asking them how much they felt their online classes expanded their skills and contributed to their knowledge on a 7-point scale (1 = not at all true of me to 7 = very true of me). These two items strongly correlated and were averaged to create one perception of learning variable, $r = .85$, $p < .001$. Third, we measured student satisfaction in their learning with one item: “In general, I was satisfied with the online class(es) I took in Fall 2020 semester.” This item used the 7-point scale (1 = not at all true of me to 7 = very true of me). These two former

categories were both more subjective measures than the GPA. They tapped into student's own perceptions and feelings. Using a combination of various measures of academic outcomes created a broader understanding of student academic outcomes. The researchers pilot tested the survey to make sure all questions were easy to understand.

Procedure

An online survey was sent to instructors of a small Midwestern University who then emailed the survey to their students or posted it on the university's learning management system. At the start of the survey, participants were provided an electronic informed consent. The bottom of the electronic consent form informed participants that clicking continue implied consent to participate in the study. They then answered items related to the core measures of motivation, engagement, and academic outcomes in their online classes. The online survey was created in Alchemer, an online survey platform, and was estimated to take about ten minutes to complete. All data was anonymous. The survey only asked about online classes in general and did not ask for specific course names so that participants could not be identified by the courses they took. This study was approved by the university's ethics board.

Results

Table 1 presents the descriptive statistics for all variables. Overall, participants motivation and engagement scores were slightly above the midpoint of the respective scales. This suggests that motivation and engagement were present but not particularly high among participants.

Table 1

Means and Standard Deviations for All Variables.

	M	*SD*
Motivation	4.78	1.05
Engagement	3.34	.62
GPA	3.09	.87
Perceptions of learning	4.12	1.59
Satisfaction	4.49	1.78

Note. Motivation, perceptions of learning, and satisfaction were on a 7-point scale. Engagement was measured on a 5-point scale. GPA was measured on a 4.0 scale.

Correlations were conducted to examine the relationship among the academic variables (see Table 2). Interestingly, the correlation between GPA and student perceptions of learning was not significant. However, the correlation between GPA and student satisfaction was significant, where a higher GPA was associated with greater satisfaction. The correlation between student satisfaction and perception of learning was also significant. Greater perceptions of learning were associated with greater satisfaction.

Table 2

Correlations between GPA, Perceptions of Learning and Satisfaction

Variable	1	2
1. GPA	-	
2. Perceptions of learning	.29	-
3. Satisfaction	.50*	.84**

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

Regression Analyses

Motivation and Academic Outcomes

To test H1a, regression analyses were conducted to test whether motivation predicted academic outcomes. First, we tested motivation as a predictor of GPA. Motivation explained a significant proportion of variance in GPA, $R^2 = .12$, $F(1, 38) = 5.13$, $p = .03$, and significantly predicted GPA, $\beta = .35$, $t = 2.27$, $p = .03$. Next, we tested motivation as a predictor of perceptions of learning. Motivation explained a significant proportion of variance in student perceptions of learning, $R^2 = .41$, $F(1, 39) = 26.82$, $p < .001$, and was a significant predictor of perceptions of learning, $\beta = .64$, $t = 5.18$, $p < .001$. Finally, we tested whether motivation predicted students' learning satisfaction. Motivation explained a significant proportion of variance in student satisfaction, $R^2 = .36$, $F(1, 39) = 21.82$, $p < .001$, and was a significant predictor of student satisfaction, $\beta = .60$, $t = 4.67$, $p < .001$. These findings supported H1a, where higher level of motivation predicted a higher GPA, greater perceptions of learning, and greater satisfaction.

Engagement and Academic Outcomes

To test H1b, regression analyses were conducted to assess whether engagement predicted academic outcomes. Engagement explained a significant proportion of variance in GPA, $R^2 = .19$, $F(1, 38) = 8.76$, $p = .005$, and significantly predicted GPA, $\beta = .43$, $t = 2.96$, $p = .005$. Engagement also explained a significant proportion of variance in perceptions of learning, $R^2 = .32$, $F(1, 39) = 18.41$, $p < .001$, and significantly predicted perceptions of learning, $\beta = .57$, $t = 4.29$, $p < .001$. Lastly, engagement explained a significant proportion of variance in student satisfaction, $R^2 = .23$, $F(1, 39) = 11.92$, $p = .001$, and was a significant predictor of student

satisfaction, β = .48, t = 3.45, p = .001. This means that higher engagement scores predicted a higher GPA, greater perceptions of learning, and greater satisfaction.

Mediation Analyses

To test H2, we examined engagement as a mediator of the relationship between motivation and academic performance. Mediation analyses were conducted using PROCESS v. 3.5 (Hayes, 2018). The effect of motivation on each academic outcome variable was reported in the regression analyses above. Therefore, only the direct effect of motivation on academic outcomes when controlling for engagement will be reported with the mediation analyses.

Motivation significantly predicted engagement, b = .44, t = 6.84, p < .001. The effect of motivation on GPA was no longer significant when controlling for engagement, b = .04, t = .24, p = .81. However, the indirect effect of motivation on GPA through engagement was not significant, indirect effect = .24, *SE* = .17, 95% CI [-.08, .60]. The effect of motivation on perceptions remained significant even when controlling for engagement, b = .74, t = 2.66, p = .01, and there was no indirect effect of motivation on perceptions of learning through engagement, indirect effect = .23, *SE* = .21, 95% CI [-.22, .62]. Finally, the effect of motivation on satisfaction remained significant when controlling for engagement, b = .89, t = 2.77, p = .009, and there was no indirect effect of motivation on satisfaction through engagement, indirect effect = .11, *SE* = .26, 95% CI [-.46, .55]. In sum, there was no evidence that engagement mediated the relationship between motivation and any of the three academic outcome variables.

Alternative Model

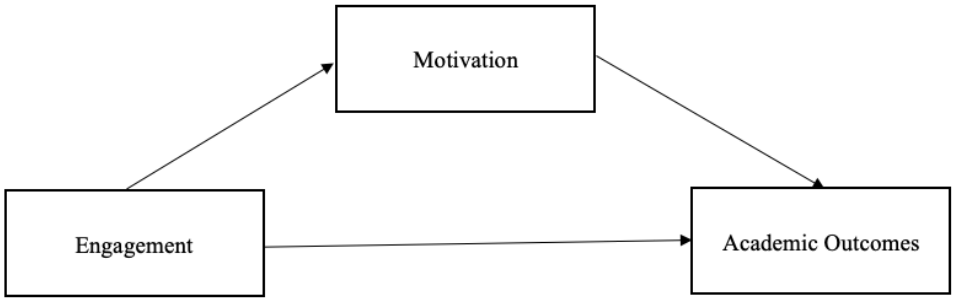
Although we expected engagement to explain the relationship between motivation and academic outcomes, there is some research that has found the reverse relationship, where motivation explains the relationship between engagement and outcomes (Barak et al., 2016;

Reeve & Lee, 2014). In a study on motivation and engagement in a massive open online course (MOOC), it was found that the number of discussion forums students participated in, as well as the number of classmates students interacted with in online groups, was linked to increased motivation (Barak et al., 2016). In other words, greater engagement via discussion forums and online groups predicted a greater increase in motivation before and after the course (Barak et al., 2016). Therefore, for exploratory purposes, we tested an alternative mediation model, with motivation explaining the relationship between engagement and academic outcomes. The conceptual model is shown in Figure 1.

Engagement significantly predicted motivation, $b = 1.25$, $t = 6.84$, $p < .001$. The effect of engagement on GPA was no longer significant when controlling for motivation, $b = .55$, $t = 1.78$, $p = .08$, and there was no significant indirect effect of engagement for GPA, indirect effect = .05, *SE* = .19, 95% CI [-.31, .45]. However, the effect of engagement on perceptions of learning was no longer significant when controlling for motivation, $b = .54$, $t = 1.15$, $p = .26$, and this indirect effect was significant, indirect effect = .92, *SE* = .41, 95% CI [.21, 1.86]. Similarly, the effect of engagement on satisfaction was no longer significant when controlling for motivation, $b = .26$, $t = .48$, $p = .64$, and this indirect effect was significant, indirect effect = 1.11, *SE* = .47, 95% CI [.35, 2.18]. The results indicate that motivation significantly mediates the relationship between engagement and perceptions of learning and student satisfaction. Specifically, greater engagement associated with greater motivation, which in turn was associated with greater perceptions of learning improvement and satisfaction.

Figure 1

Conceptual Model of Motivation as a Mediator Between Engagement and Academic Outcomes



Discussion

The purpose of the research was to evaluate the relationship between motivation, engagement, and academic outcomes. Academic outcomes were measured using three items: GPA, student perceptions of their learning improvement, and student satisfaction in learning. It was hypothesized that greater motivation (H1a) and greater engagement (H1b) would predict better academic performance. Our findings supported these predictions. The results made clear that motivation and engagement were strong predictors of academic outcomes. These findings align with previous research where motivation (Huang et al., 2014; Lazowski & Hulleman, 2016; Shih et al., 2013) and engagement (Giesbers et al, 2013; Hamm et al., 2019; Handelsman et al., 2005) were found to be significant predictors of academic outcomes.

The present study also predicted that engagement mediated the relationship between motivation and academic outcomes (H2). This hypothesis was not supported. Instead, our findings suggest the reverse is true: motivation mediates the relationship between engagement and academic outcomes measured by student perception of learning and student satisfaction in their learning. These findings suggest engaging in the materials and online class activities increases student motivation. As a result of this increased motivation, students perceive a greater

sense of academic satisfaction and learning after the course has ended. The result conflicts with findings in some previous work that found that engagement mediates the relationship between motivation and academic outcomes (e.g., Giesbers et al., 2013; Xiong et al., 2015). However, it does align with findings by Barak and colleagues (2016) and Reeve and Lee (2014). It is possible that the unique circumstances of the pandemic could explain our unique results. For instance, students in the current research did not have the choice between in-person or online classes, and students may not have wanted to take online classes. Feeling engaged in their online courses may have resulted in students enjoying their courses more and feeling more intrinsically motivated.

Findings were less clear with regard to GPA. We did find that motivation and engagement independently predicted GPA, which suggests that these two constructs are in fact important for GPA. However, the lack of significant results for the mediation analyses suggests that the interrelationship between motivation and engagement is less important for GPA than for the other academic outcomes we measured. One explanation for the different result for GPA is that GPA measures different factors than the other two measures. As mentioned, GPA is a more objective and concrete measure of academic performance, whereas perceptions of learning and satisfaction are subjective perceptions of individual's experiences with their learning. It is possible that the effects of engagement on motivation is only important for subjective measures like students' perceptions of their learning experiences. This does not mean that motivation and engagement are not important for GPA; rather, it suggests that the nature of their effects differs for different academic outcomes.

Implications

The findings of this research are valuable for both educators and students. By creating a learning environment that fosters intrinsic motivation and engagement in online classes, students

can achieve better academic outcomes (Kang & Zhang, 2020). Focusing on ways to boost engagement in online courses may be especially valuable for educators. By increasing engagement, students will feel more intrinsically motivated, which in turn can lead to better academic outcomes. There are many ways educators can foster motivation and engagement. Educators can incorporate learning activities into their classes that get students actively engaged with content. Educators can also use these activities to demonstrate the value of learning. When students feel that what they are learning is useful, they will get greater enjoyment out of it and feel more intrinsically motivated (Brophy, 2004). Educators can also promote motivation and engagement by working to connect with their students and show their students that they care about them. When educators are responsive to students, make an effort to connect with students, and make students feel understood, students become more motivated and engaged with their course (Rodriguez-Keyes et al., 2013). Specifically, using verbal reinforcement, giving feedback, instructing well and responding to student progress will affect learning outcomes (ChanLin, 2009).

Limitations and Future Directions

There are several limitations to this research that should be addressed in future research. First, this research was cross-sectional and correlational. Future research using longitudinal and experimental designs is needed to more directly test the causal relationship between motivation, engagement, and academic outcomes. Additionally, the current research was conducted using self-report with a small group of college students in a small university in the Midwest. The results for this sample may not reflect the general population of all students. Future research needs to recruit a representative sample which includes several types of diverse students from different colleges at different periods. Future research using additional methods of measurement

to address self-report biases, such as directly observing student engagement in a learning environment, is also needed. Additionally, research investigating individual differences in the relationship between motivation, engagement, and academic outcomes would be valuable for further understanding how students are differentially affected by online learning. Finally, future research can build on this research by testing specific ways, such as specific learning activities or interventions, to increase students' motivation and engagement to bring about positive learning outcomes.

Conclusions

The present research examined the relationship among motivation, engagement, and academic outcomes. Findings showed that motivation and engagement were independent predictors of GPA, student perceptions of learning, and student learning satisfaction. This research suggested that higher motivation and engagement predicts greater academic performance. The findings also showed that motivation significantly mediated the relationship between engagement and perceptions of learning, as well as the relationship between engagement and student satisfaction. Overall, findings suggest the promoting motivation and engagement in online classes is valuable for promoting student success.

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