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Pandemic Pedagogy and Emergency Remote Instruction: Transitioning Scheduled In-Person Courses to Online Diminishes Effective Teaching and Student Learning Outcomes

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ABSTRACT

Conducted during a semester of remote emergency instruction due to the COVID-19 pandemic, this study examined the effects of rapidly switching an originally scheduled in-person course to an online course offering (after the course had already started in-person) on effective teaching behaviors and student learning outcomes. Results from 163 undergraduate students, who completed survey assessments about their course that was both in-person and then later online, indicated that switching the course modality diminished their learning opportunities by decreasing performance efficacy in the course, sustained attention to instruction, motivation to process the course material, and affect for the course content. Moreover, results indicated that students received less teacher confirmation after the switch, which in turn, produced a decline in learning outcomes. However, students higher in effort regulation were not affected as much by the rapid change in course modality. These findings offer pedagogical implications for emergency remote instruction when originally scheduled face-to-face courses no longer meet in person.

KEYWORDS

Teacher confirmation; effective teaching; online teaching; pandemic teaching; student learning

During the 2020–2021 academic year, the COVID-19 pandemic created unique obstacles for students who were required to attend courses with remote emergency instruction and rapidly adjust to new ways of learning (Adedoyin & Soykan, 2020). Pokhrel and Chhetri (2021) noted that the pandemic “created the largest disruption of education systems in human history, affecting nearly 1.6 billion learners in more than 200 countries” (p. 133). The closures of campuses and implementation of lockdown measures forced students who were attending traditional face-to-face college courses to suddenly switch from in-person to online instruction. This sudden switch left educators unaccustomed to (and potentially unprepared for) emergency remote instruction, which differs from conventional online teaching (Trust & Whalen, 2020), bringing to light new challenges for both teaching and learning (Lowenthal et al., 2020). As the COVID-19 pandemic created new institutional challenges, college students were forced to adapt quickly to new instructional methods (Morreale et al., 2021) they may not have been comfortable or competent in using (Arnett, 2020). Students also faced the added anxiety associated with changes to their living environments (e.g., returning home, being quarantined) including struggles with adapting to synchronous and asynchronous online learning and a potential lack of resources to complete their online courses in their disrupted living and learning environments (Schwartzman, 2020). There is evidence that campus restrictions and shutdowns caused by the COVID-19 pandemic have jeopardized students’ learning (Mahdy (2020 (2020)). For example, students reported that the use of Zoom during emergency remote instruction lowered the quality

of their education and negatively impacted their ability to learn the class content (Serhan, 2020) and that they struggled to keep up with their work when their classes transitioned online (Ramlo, 2021). Given the teaching and learning challenges due to the rapid switch to remote emergency instruction, the purpose of our study was to assess how the switch from traditional face-to-face instruction to online instruction impacted teaching and learning outcomes. Moreover, we sought to determine if effort-regulated students were less impacted by the transition to remote emergency instruction.

The switch from face-to-face to online instruction caused by the COVID-19 pandemic could have potentially deleterious effects on student learning outcome for several reasons including technological issues (Arnett, 2020), higher levels of stress and difficulty staying motivated in their courses (Day et al., 2020), and increased distractions in the learning environment (Gillis & Krull, 2020). Westwick and Morreale (2021) noted that universities were unprepared for rapid remote teaching transitions, stating that “we need to understand why the rapid shift to online teaching was disquieting for faculty and students alike” and “the rush to entirely online and remote teaching and learning are useful cases in point for considering challenges and opportunities for individual members of the communication professoriate” (pp. 219–220). Thus, amid the pandemic, we sought to assess students’ perspectives of their transitioned courses for those were involved in a natural within-subjects experiment; that is, students who attended a college course in-person at the beginning of the Fall 2020 semester but were then asked to abruptly pivot to emergency remote instruction in the same course weeks after starting it. We were interested in determining if students’ learning outcomes may have been impacted by the switch to remote instruction, including detriments to their performance efficacy (beliefs they are able to succeed at their academic tasks in the course; Pintrich & de Groot, 1990), sustained attention (their ability to maintain their attention throughout class sessions; Ko et al., 2017), motivation to process course content (their desire to deeply think about course content; Bolkan et al., 2016), and student affect for the course content (their positive feelings toward the material they were learning; McCroskey, 1994).

These learning outcomes were selected because students’ abilities to place their attention on completing tasks (Steinmayr et al., 2010), their desire to process instructional material and enjoy their courses (Bolkan et al., 2016), along with their beliefs that they can succeed in their course (Pintrich & de Groot, 1990), are central to their academic success in online environments (Joo et al., 2013). During the first round of emergency remote instruction in Spring 2020, students paid less attention and enjoyed courses less after the transition online (Garris & Fleck, 2020). Students also reported declines in self-efficacy for online skills during this period, including the ability to be successful in courses (Aguilera-Hermida, 2020) and struggled with motivation (Aboagye et al., 2020) as the result of the quick transition online. Because emergency remote instruction was a disruption to students’ enrollment in originally scheduled traditional FtF courses (Pokhrel & Chhetri, 2021), we anticipated declines in learning outcomes impacted by the course modality transition and offer our first hypothesis:

H1a: Students’ performance efficacy will decline after transitioning a course from face-to-face to online instruction.

H1b: Students’ sustained attention will decline after transitioning a course from face-to-face to online instruction.

H1c: Students’ motivation to process material will decline after transitioning a course from face-to-face to online instruction.

H1d: Students’ affect for their courses will decline after transitioning a course from face-to-face to online instruction.

Student's Effort Regulation

However, we reasoned that not all students might have experienced learning detriments from the sudden transition, especially those students who are able to self-regulate their learning. Effort regulation, which refers to students' ability to maintain their focus on academic tasks in the face of difficulties or distractions (Pintrich et al., 1991), might moderate the effect of course modality transition on student learning outcomes. Effort regulated students may feel more efficacious about their learning, manage their time better, and utilize more cognitive strategies for learning (Credé & Phillips, 2011). These students are able to stay committed to their academic goals because they have the ability to focus on their studies rather than succumb to outside distractions (Sen, 2016). Because effort regulated students are more committed to achieving their academic goals and persist when confronted with online academic challenges (Broadbent & Poon, 2015), we expected that when students experienced a shift from face-to-face to online instruction, the reduction in learning outcomes may have been buffered by their ability and maintain their efforts toward their class-related tasks and goals. That is, students who have more self-control are able to stay on task despite challenges that may arise (Davisson & Hoyle, 2017), while students who have less self-control over their learning may struggle to keep up with their coursework during the switch. Therefore, we proposed a research question to explore the role of students' effort regulation as a moderator of their learning outcome detriments:

RQ: Are potential declines in students' learning outcomes due to the transition from face-to-face to online instruction less pronounced for students higher in effort regulation?

Teacher Confirmation

Student learning outcomes might also be affected by the transition from in-person to remote teaching because of changes in instructors' effective teaching behaviors due to the challenges of a rapid switch in teaching modality. We argue that teacher confirmation, the ongoing process through which instructors communicate to students that they are valuable individuals (Ellis, 2000), might be a difficult teaching behavior to adapt from traditional FtF contexts to remote classrooms – especially when instructors are given little time to prepare – thereby diminishing student learning outcomes. Confirmation theorists have stressed the fundamental importance of confirmation in constructing one's identity, suggesting that every individual has an innate desire to be confirmed (Buber, 1957) and that confirmation is the “greatest single factor ensuring mental development and stability” (Watzlawick et al., 1967, p. 84). Given its significance, it is unsurprising that in classroom contexts, teacher confirmation has the potential to promote students' affect, motivation, satisfaction, and participation (Goodboy & Myers, 2008).

Teachers communicate confirmation through acts such as responding to students' questions (e.g., being available for questions before and after class), demonstrating interest in students' learning (e.g., smiling and nodding at students during lectures), and using an interactive teaching style (e.g., incorporating activities to complement lecture material; Ellis, 2000). In online environments, teachers might additionally demonstrate interest and confirm students as significant individuals through acts that show empathy and care. For instance, students' most memorable messages they received from their instructors during remote instruction included when instructors checked on their mental health, provided reassurances, and attempted to comfort students (Kaufmann et al., 2021). Instructors might send simple e-mails or make a quick statement before or after class to acknowledge the state of the pandemic and remind students that they could reach out to them at any time, potentially boosting students' motivation and morale (Kaufmann et al., 2021).

Some confirming teaching behaviors may be more difficult to communicate in remote classrooms – especially when an instructor is not prepared for a sudden change in teaching modality. For instance, nonverbal behaviors such as making eye contact and nodding to demonstrate listening may be difficult to

communicate or nonapparent through unfamiliar interfaces. In addition, some interactive techniques may not be performed as well in virtual environments. Students may not be readily by their computers to participate in in-class exercises or instructors may not have had adequate time during an emergency transition to adapt course activities from a FtF to a remote format (Adedoyin & Soykan, 2020), therefore lacking efficacy in administering these activities through a teleconferencing platform. Lastly, instructors may not readily recognize when students have questions in an online modality format. While managing the class in a new format, it may be difficult to notice raised hands or pending messages in the chatroom thereby making it difficult to respond to students' questions. As a consequence of no longer meeting students in person, declines in teacher confirmation should predict declines in student learning outcomes because instructors may not be able to easily communicate confirming teaching behaviors that students may be accustomed to and are regularly offered in FtF courses. Therefore, we predicted that teacher confirmation will decrease from the same instructor as courses switch to online, and that these decreases, in turn, should predict declines in student learning outcomes (i.e., within-subjects mediation):

H2: Students will receive less teacher confirmation in a course after the transitions from face-to-face to online instruction.

H3: The transition from face-to-face to online instruction will reduce opportunities for teacher confirmation, which in turn, will predict declines in student learning outcomes.

Method

Participants and procedures

After obtaining approval from the institutional review board, 163 undergraduate students were recruited from communication studies courses at a large university to participate in this study. Students received minimal extra credit for their participation. Participants reported on a course that met in-person, either a FtF course which met at least once a week ($n = 83$) or a hybrid course ($n = 80$) which met both FtF and online each week. Two weeks into the fall semester, as COVID infections increased on campus, students rapidly transitioned from the in-person course to a remote online classroom format for two weeks. Thus, eligible students for the study must have been enrolled in a class that met FtF at least once a week before the shift to online instruction. Participants were recruited from communication courses through FtF announcements and posts on the department's bulletin board and website, however participants were able to report on any course they were enrolled in that met FtF, regardless of academic discipline. As a result, participants reported on 67 different courses, including communication, biology, chemistry, and foreign language courses, among others. An online questionnaire with repeated measures was administered to assess student learning outcomes during the two weeks of FtF instruction and two weeks of remote online instruction. The average age of participants was 19.61 years ($SD = 2.07$). One hundred and thirty students identified as white, 10 as Middle Eastern, seven as Hispanic, six as African American, three as Asian, three as mixed race, and four as other. When courses moved to fully online, they were taught using synchronous online lectures ($n = 93$), synchronous online discussions ($n = 80$), asynchronous prerecorded lectures ($n = 78$), narrated slides ($n = 79$), breakout groups ($n = 33$), discussion forums ($n = 43$), online assignments ($n = 145$), online exams ($n = 125$), online polling features ($n = 43$), teaching games ($n = 13$), and digital whiteboards ($n = 7$).

Instrumentation

Composite reliability (ω) was calculated using maximum likelihood estimation for all measures using the OMEGA macro (Hayes & Coutts, 2020). Teacher confirmation was measured using Ellis's (2000) teacher confirmation scale. Five items measured *response to questions* (e.g., "took time to answer

students' questions fully"), six items measured *demonstrated interest* (e.g., "made an effort to get to know students"), and five items measured *teaching style* (e.g., "used an interactive teaching style"). Responses ranged from (1) *strongly disagree* to (5) *strongly agree*. Coefficient ω for response to questions was .876 for the FtF measure and .908 for the online measure. Coefficient ω for demonstrated interest was .842 for the FtF measure and .909 for the online measure. Coefficient ω for teaching style was .804 for the FtF measure and .874 for the online measure.

Effort regulation was measured using the 4-item effort regulation subscale from the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1991). An example item from this measure is, "I work hard to do well in this class even if I don't like what we are doing." Responses ranged from (1) *not at all true of me* to (7) *very true of me*. Effort regulation was only measured at one time during the study as a time-invariant moderator with a coefficient ω of .680.

Performance efficacy was measured using the 8-item self-efficacy for learning and performance subscale from the MSLQ (Pintrich et al., 1991). An example item from this measure is "I believed I would receive an excellent grade in this class." Responses ranged from (1) *not at all true of me* to (7) *very true of me*. Coefficient ω was .945 for the FtF measure and .972 for the online measure.

Four items were taken from an instrument used by Wei et al. (2012) to measure sustained attention. An example item from this measure is "I paid full attention to the lecture during class." Responses ranged from (1) *not at all true of me* to (7) *very true of me*. Coefficient ω was .768 for the FtF measure and .843 for the online measure.

Four items were taken from an instrument used by Bolkan et al. (2016) to measure students' motivation to deeply process course material. An example item from this measure is "I was motivated to think deeply about what was being taught in this class." Responses ranged from (1) *not at all true of me* to (7) *very true of me*. Coefficient ω was .920 for the FtF measure and .957 for the online measure.

Students' affect for course content was measured using four items from McCroskey's (1994) instructional affect assessment instrument. Each item was measured using a 7-point semantic differential scale using the anchors: good/bad, worthless/valuable, fair/unfair, and negative/positive. Coefficient ω was .927 for the FtF measure and .943 for the online measure.

Results

Paired samples *t*-tests were used to compare dependent means of repeated measures for learning outcomes (H1) and teacher confirmation dimensions (H2) within FtF vs online delivery modalities of the same course. To answer the RQ, MEMORE version 3.4.1 (Montoya & Hayes, 2017) was used to test two-instance repeated measures moderation (Montoya, 2019) of learning outcome decreases from FtF to online instruction transitions, moderated by students' effort regulation. To test H3, a within-subjects parallel multiple mediation model (Judd et al., 2001) was estimated using MEMORE to test the indirect effect of the FtF to online teaching switch on learning outcome declines through reductions in teacher confirmation. Bootstrapping was used to generate 95% confidence intervals for indirect effects using 5,000 bias-corrected bootstrap samples.

Hypothesis one predicted that students' learning outcomes in the same course would decline when an originally scheduled FtF course switched to online instruction. Paired samples *t*-tests indicated that on an average, switching from an originally scheduled FtF course to an online course delivery decreased students' performance efficacy ($t = 5.519$, $d = .438$), sustained attention ($t = 7.004$, $d = .558$), motivation to process ($t = 6.563$, $d = .510$), and affect for content ($t = 7.164$, $d = .572$). Full statistical reporting of the repeated measures for learning outcomes are displayed in Table 1.

The research question inquired if decreases in student learning outcomes from the FtF to online course transition would be moderated by students' effort regulation. That is, we sought to determine if learning outcomes would be less compromised by the online transition for students who are higher in self-control regarding their academic endeavors. To answer the RQ, we employed two-instance moderation analysis for repeated measures (Montoya, 2019) and tested for conditional effects of learning outcome differences from FtF to online course transitions. Using procedures described by

Table 1. Paired samples differences of learning outcomes.

Variable	FtF		Online		<i>r</i>	<i>t</i>	df	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Performance Efficacy	5.859	1.031	5.432	1.379	.708	5.519*	158	.438
Attention	5.078	1.195	4.245	1.366	.326	7.004*	157	.558
Motivation to Process	5.418	1.222	4.676	1.619	.520	6.563*	160	.510
Affect for Content	6.003	1.167	5.194	1.634	.532	7.164*	156	.572

All paired samples correlations and *t* tests are significant at $p < .05$.

Montoya (2019), we regressed the difference of student learning outcome declines ($Y_2 - Y_1 = Y_D$) onto effort regulation (W) to determine if the relationships between course modality (FtF to online) and learning outcomes differences were dependent upon students' effort regulation. If the slopes for effort regulation are significant in these within-subject moderation models, we can conclude that there is an interaction between the moderator (effort regulation) and course delivery (FtF transitioning to online). Effort regulation moderated declines (from FtF to online delivery) in performance efficacy, $F(1, 157) = 9.930, p = .002, R^2 = .059$; and affect toward the course content, $F(1, 155) = 4.392, p = .038, R^2 = .028$; but did not moderate declines in sustained attention, $F(1, 156) = .762, p = .384, R^2 = .005$; nor motivation to process, although it approached statistical significance, $F(1, 159) = 3.678, p = .057, R^2 = .023$.

After detecting moderation for declines in performance efficacy ($B = .213, CI: .079, .346$) and affect toward content ($B = .212, CI: .012, .412$), significant interactions were then probed using the simple-slopes method to estimate conditional effects at values of the moderator ($-1 SD, M, +1 SD$). The decrease in performance efficacy from the FtF to online delivery transition was strongest for relatively low effort regulated students, became weaker for average effort regulated students, and there was no significant decrease for relatively high effort regulated students (see Table 2 for moderated effects).

The decrease in affect toward course content from FtF to online delivery became less pronounced for higher effort regulated students but decreases in affect were significant at all three values of effort regulation, including at relatively lower effort regulation (see Table 3 for moderated effects).

Hypothesis three predicted that opportunities for teacher confirmation would decline when an originally scheduled FtF course switched to online instruction. Paired samples *t*-tests indicated that on an average, switching from an originally scheduled FtF course to an online course delivery decreased the teacher confirmation behaviors of responding to questions ($t = 6.079, d = .480$) and demonstrating interest ($t = 3.888, d = .310$), but not interactive teaching style ($t = 1.075, d = .086$). Full statistical reporting of the repeated measures of learning outcomes are reported in Table 4.

Hypothesis four was tested using a within-subject mediation model, predicting that if the transition from FtF to online instruction yielded decreases in students' learning outcomes (performance efficacy, sustained attention, motivation to process, affect for course), these decreases would be explained in part, indirectly by decreases in teacher confirmation. Because the interactive teaching dimension of

Table 2. Conditional effect of course delivery on performance efficacy at values of effort regulation.

Effort Regulation	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	LLCI	ULCI
4.186 (low)	-.665	.107	-6.236	<.001	-.875	-.454
5.303 (average)	-.427	.075	-5.672	<.001	-.576	-.278
6.421 (high)	-.189	.107	-1.773	.078	-.400	.022

Table 3. Conditional effect of course delivery on affect for content at values of effort regulation.

Effort Regulation	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	LLCI	ULCI
4.239 (low)	-1.044	.158	-6.569	<.001	-1.356	-.731
5.347 (average)	-.809	.112	-7.241	<.001	-1.030	-.588
6.455 (high)	-.574	.044	-4.743	<.001	-.297	-.123

Table 4. Paired samples differences in teacher confirmation.

Variable	FtF		Online		<i>r</i>	<i>t</i>	df	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Responding to Questions	6.318	.606	6.053	.769	.702	6.078*	159	.480
Demonstrating Interest	6.087	.667	5.905	.924	.774	3.888*	157	.310
Teaching Style	5.837	.863	5.780	.980	.747	1.075	158	.086

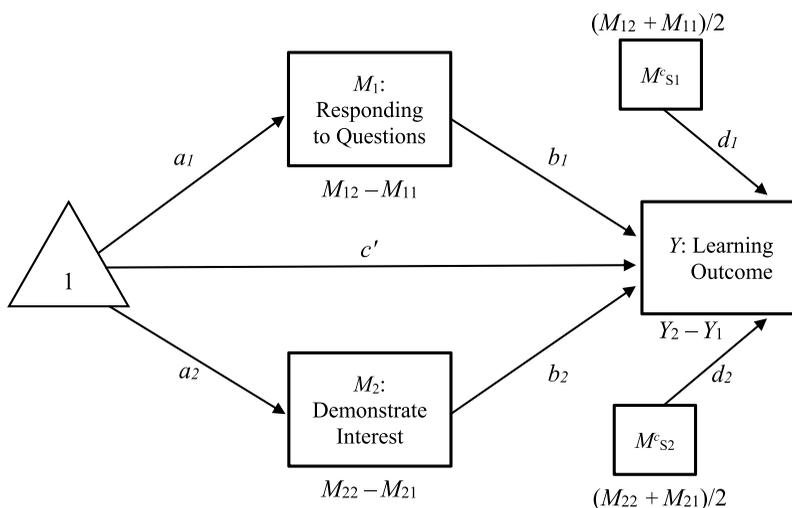
* $p < .05$.

confirmation did not decline from FtF to online instruction, only the responding to questions and demonstrating interest dimensions served as parallel mediators (controlling for each other's effect as correlated behaviors). The statistical diagram for within-subjects parallel mediation models is displayed in Figure 1. All within-subject tests of mediation were conducted using 5,000 bias-corrected bootstrap samples to generate confidence intervals for indirect effects.

The mediation model for *performance efficacy* is displayed in Figure 2. The effect of switching from FtF to online instruction on performance efficacy declines was mediated by demonstrating interest ($a_2b_2 = -.131 [-.255, -.053]$) but not responding to questions ($a_1b_1 = -.066 [-.150, .001]$). After controlling for teacher confirmation dimensions, the FtF to online course delivery transition had a direct and negative effect on performance efficacy ($c' = -.456 [-.614, -.298]$).

The mediation model for *sustained attention* is displayed in Figure 3. The effect of switching from FtF to online instruction on sustained attention was mediated by demonstrating interest ($a_2b_2 = -.088 [-.196, -.015]$) but not responding to questions ($a_1b_1 = -.067 [-.194, .054]$). After controlling for teacher confirmation dimensions, the FtF to online course delivery transition had a direct and negative effect on sustained attention ($c' = -.738 [-1.000, -.477]$).

The mediation model for *motivation to process* is displayed in Figure 4. The effect of switching from FtF to online instruction on motivation to process was mediated by demonstrating interest ($a_2b_2 = -.146 [-.283, -.053]$) but not responding to questions ($a_1b_1 = .102 [-.016, .248]$). After controlling for teacher confirmation dimensions, the FtF to online course delivery transition had a direct and negative effect on motivation to process ($c' = -.730 [-.982, -.478]$).

**Figure 1.** Statistical diagram of within-subjects parallel mediation model.

The superscript ^c indicates mean centered. This model was estimated 4 times for each learning outcome (Y): performance efficacy ($Y1$), sustained attention ($Y2$), motivation to process ($Y3$), and affect toward course content ($Y4$).

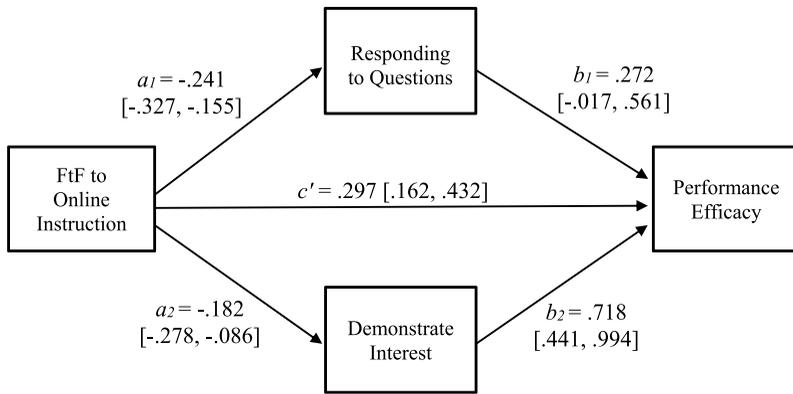


Figure 2. Within-subjects parallel mediation model for performance efficacy ($N = 151$). Path coefficients are unstandardized with 95% confidence intervals.

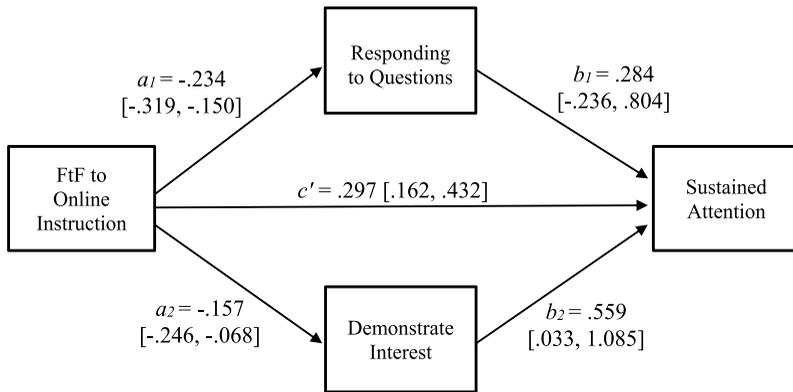


Figure 3. Within-subjects parallel mediation model for sustained attention ($N = 151$). Path coefficients are unstandardized with 95% confidence intervals.

The mediation model for *affect toward course content* is displayed in Figure 5. The effect of switching from FtF to online instruction on course affect was mediated by demonstrating interest ($a_2b_2 = -.121 [-.251, -.037]$) but not responding to questions ($a_1b_1 = -.039 [-.163, .074]$). After controlling for teacher confirmation dimensions, the FtF to online course delivery transition had a direct and negative effect on affect for the course content ($c' = -.827 [-1.053, -.601]$).

Discussion

The purpose of this study was to (a) evaluate how the switch from FtF to online instruction might negatively impact students' learning outcomes, (b) test the moderating effects of effort regulation on learning outcome detriments, and (c) ascertain the degree to which a decline in teacher confirmation behaviors from a modality switch explained diminished learning outcomes. As predicted, the switch to online instruction from face-to-face instruction led to decreases in student learning outcomes, including performance efficacy, sustained attention, motivation to process, and affect for the course content.

Our study also demonstrated the importance of students' effort regulation in their learning. Students who reported high levels of effort regulation experienced less of a decline in affect for the course and had less of a decline in performance efficacy than those who reported average or lower levels. When students returned home from campus, they may have been exposed to distractions that

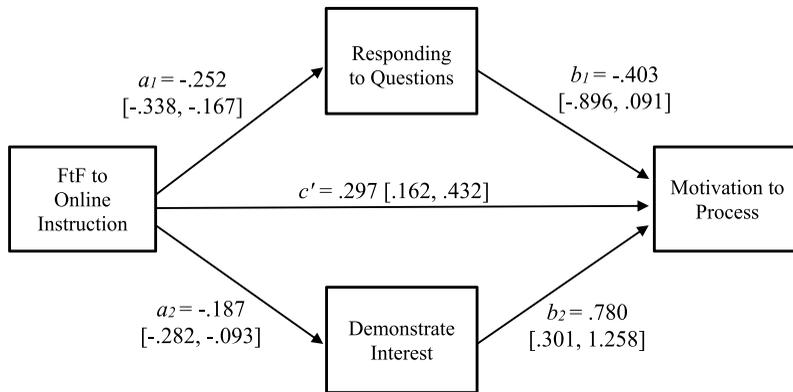


Figure 4. Within-subjects parallel mediation model for motivation to process ($N = 153$). Path coefficients are unstandardized with 95% confidence intervals.

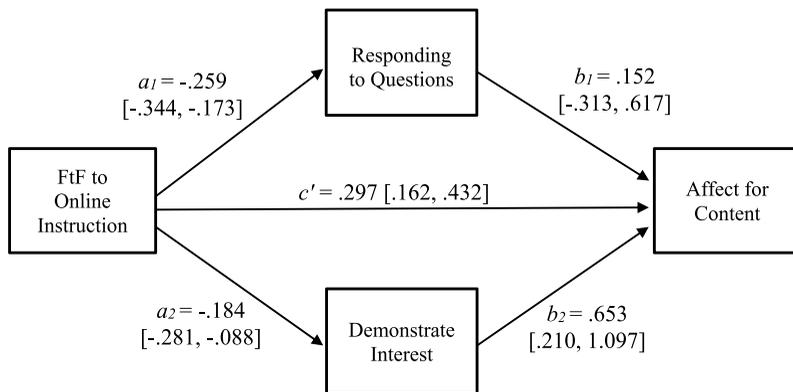


Figure 5. Within-subjects parallel mediation model for affect toward course content ($N = 150$). Path coefficients are unstandardized with 95% confidence intervals.

would not normally be present in traditional classrooms including increased screen time (Hicks et al., 2021), intrusions from family members (Adedoyin & Soykan, 2020), and household responsibilities (Pokhrel & Chhetri, 2021) that may have made completing coursework more challenging for them. Differences in online course designs may have also given students more opportunities for distractions including the need to self-regulate and focus on asynchronous lectures, narrated slides, and discussion forums, among others online components not present in FtF courses. Because high effort-regulated students are better able to persist when confronted with online course distractions (Broadbent & Poon, 2015), these students likely found it easier to adapt to the challenges associated with the rapid transition to online instruction than low effort-regulated students. As a result, their self-efficacy for learning and affect for the course content were diminished less because they may have felt better able to persevere through the switch despite distractions and remain committed to achieving their academic goals after the transition.

In addition to student learning, the COVID-19 pandemic appeared to diminish teacher confirmation as students reported that their instructors did not demonstrate as much interest in their learning nor did they respond to their questions as much as they did when the course began in-person. Moreover, demonstrating interest uniquely mediated the relationship between the switch from face-to-face and online instruction and the four learning outcomes while responding to questions did not, suggesting that demonstrating interest may serve a much more pivotal role in influencing student learning outcomes during a switch to emergency remote instruction. In other words, during remote

instruction, students felt that their instructors did not inquire as much about how the course was going and did not communicate their beliefs in students' abilities to succeed in the transitioned course. In part, because instructors demonstrated less interest in their students' learning after the modality switch, students felt less efficacious in their ability to learn, were not as motivated to deeply process course information, sustained less attention toward lectures, and developed less affect for the course content.

An interesting finding from our study was that despite decreases in demonstrated interest and response to questions, students' perceptions of their instructors' interactive teaching style remained relatively stable from FtF to online instruction. One reason this may have been the case is that video conferencing platforms (e.g., Zoom) offer built-in features that afford new interactive elements that may not be commonly used in traditional FtF classrooms. For instance, students indicated that compared to the instructional activities used in FtF conditions, instructors were more likely to use teaching games, polling features, live discussions, and breakout groups during the two weeks of online instruction. While a rapid transition to remote emergency instruction appears to be a detriment to student learning outcomes and effective teaching, an implication of this finding is that it may not be as difficult for instructors to engage in interactive elements in an online classroom. It is important to note that previous student and instructor experiences in Spring 2020 might influence these findings. Specifically, students may have been more accustomed to emergency remote instruction in the Fall compared to their experiences transitioning in the Spring semester, which may have helped them become more accepting of the need to be online (Kinsky et al., 2021). Additionally, our results indicated that many students ($n = 83$) were enrolled in hybrid courses. These HyFlex or BlendFlex courses (Miller et al., 2020), which contain both in-person and online elements, could influence our results as well, as students had online components in their courses already to accompany the in-person instruction. Finally, instructors may also have been more prepared for emergency remote instruction from their pedagogical experiences or training from their previous semester online (Westwick & Morreale, 2021).

Implications for teaching

The results of this study have important implications for both teaching and learning. First, the most obvious takeaway is that universities avoid, if possible, the rapid shift from face-to-face to online instruction in the same course. The switch from face-to-face to online instruction hampered students' opportunities to learn. This takeaway, on one hand, may be unhelpful after the pandemic is more manageable, as universities (more safely) return to fully in-person instruction with much less possibility for an emergency quick shift in course modality (from a majority of students and faculty receiving vaccinations). On the other hand, because of COVID-19 variants that continue to spread infections, universities might find the need for a rapid shift to emergency remote instruction again. Westwick and Morreale (2021) suggested that academic departments explore lessons learned from their instructors who taught courses using emergency remote instruction and consider how to overcome digital pedagogy challenges so that students may have optimal online learning opportunities; they urge departments to train faculty on learning management systems and instructor/student interactions in digital environments.

The results of our study continue to demonstrate the importance of students' effort regulation in their own learning. Because previous research has demonstrated moderating effects of effort regulation between teaching behaviors and cognitive learning (Bolkan et al., 2017), this is a fruitful area of research for instructional scholars to take on. Practically, training interventions for students could be an important resource for them to learn the skills to become more effort-regulated in their learning. For example, teaching students how to set goals for themselves, monitor their progress toward those goals, and assessing when their behavior deviates from those goals could help students become better able to control their behavior (Inzlicht et al.,

2014). For example, McDaniel and Einstein (2020) proposed the KBCP framework as a way for students to improve this skill. The KBCP framework helps students develop knowledge about effective learning strategies, develop the belief that the strategies will help them succeed, commit to utilizing the strategies in their studying, and plan to implement these learning strategies into their routines to perform better in school. Implementing training sessions such as these for freshmen at in introductory courses may help students develop these skills and feel better able to be successful in school overall. Finally, instructors should find ways to confirm their students online despite the change in the course modality. While virtual learning environments eliminate some aspects of FtF encounters that afford opportunities for teacher confirmation, there are ways online that instructors can express recognition of students as unique individuals, acknowledge their significance, endorse their feelings, express concern for them, and demonstrate a willingness to be invested in their learning – which are all fundamental elements of communicating confirmation (Sieburg, 1973). In practice, this can be accomplished by spending more time crafting helpful individualized feedback on students' assignments to signal interest in their learning, soliciting students' concerns or comments about online instruction to convey that their opinions matter and are taken into consideration, and allowing for flexibility with course policies for students who might be struggling – a lesson learned from the pandemic (Tatum & Frey, 2021). Instructors can also use various video conferencing platform features which allow opportunities for in-class communication that more closely mirror a FtF learning environment. For instance, polling features allow instructors to ask and answer quiz-like questions pertaining how they think the class is progressing (Lindsay & Whalley, 2020), which could also be used to check in with students before and during class meetings about their personal feelings. Similarly, chatroom features that are particularly useful for facilitating conversations and answering students' live questions (Frangou & Keskitalo, 2020), could also be useful for getting to know students akin to socializing in FtF classrooms at the beginning of class or during breaks. Even making a small habit of adding brief confirming messages in routine class-related e-mails can impart a sense of recognition of students' value. As our results have shown and our discussion has illustrated, teacher confirmation is not a means to an end but rather, a semester-long endeavor to promote student learning outcomes.

Limitations

The results of the study can only be viewed through its limitations. First, a limitation of this study is the timing of the data collection. The two-week shift to online instruction and the subsequent data collection took place during the first month of the semester. In the early part of the semester, students may not be completing as many assignments or exams, which could influence their perceptions of their learning. Yet, Horan et al. (2011) found that within the first few weeks of the semester, teacher confirmation positively predicted students' value outcome judgments of the remaining semester, demonstrating the benefit of making students feel valued early on and setting the students' expectations for the rest of the semester. A second limitation of the study is the unplanned nature of the switch to online instruction. The unplanned nature of the switch could be the true cause of the decreases in learning, and a more planned preparation for online instruction could potentially negate some of these effects. Despite the study's limitations, there are still important future directions to consider including the development of pedagogical emergency plans for moving courses online in times of crisis (e.g., if COVID variants require another campus shutdown). Future research should also determine the effectiveness of online teaching and learning workshops geared toward making instructors who traditionally teach FtF, more effective online educators (i.e., do online teaching workshops actually make better online educators?). Finally, future research should focus on how instructors can confirm their students in online classes using technologies such as Zoom.

Conclusion

The COVID-19 pandemic created disruptions for students and instructors alike. The rapid switch of a course scheduled originally in-person to online instruction forced students to adapt quickly to major changes in their educational experience that hindered their learning opportunities. Yet, effort-regulated students were less impacted by this modality switch. Importantly, instructors should confirm their students by demonstrating interest in their learning in online learning environments. By doing so, they might offset learning detriments to some degree. Unfortunately, the pandemic itself and required shifts in course modality had direct effects on students' learning outcomes altogether regardless of instructor confirmation, which ultimately speaks to the importance of universities having world-class online learning environments ready to go in case originally scheduled in-person courses need to switch to online again for students' safety. Now that universities are more prepared for a global pandemic, we hope that these results might be tempered by better student and instructor preparation if course offerings must pivot again.

Disclosure statement

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