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Technology-Focused Multitasking Self-Efficacy and Performance: Whether You Think You Can or Think You Can't – You Can't

Peter E. Doolittle
Virginia Tech

Krista P. Wojdak
Appalachian State University

C. Edward Watson
American Association of Colleges and Universities

Dawn N. Adams
Virginia Tech

Gina Mariano
Troy University

Abstract: Multitasking has been demonstrated to negatively impact performance across a wide range of tasks, including in the classroom, yet students continue to multitask. This study examined the relationship between college students' perceptions and performance of technology-based multitasking. Technology-based multitasking and self-efficacy data were collected and analyzed from 265 undergraduate students. Students engaged in a technology-based multitasking perceptions survey, a video + survey multitasking task or a video-only non-multitasking task, and a technology-based self-efficacy survey. An analysis of student perceptions indicated that students understood that different tasks required different levels of mental effort to complete successfully and that multitasking across high-mental effort tasks required greater effort than multitasking across low-mental effort tasks. In addition, students in the video + survey multitasking group significantly underperformed students in the video-only non-multitasking group. Finally, the relationship between technology-based multitasking and self-efficacy was addressed in a correlational analysis between student technology-based multitasking scores and technology-based self-efficacy scores, yielding no significant relationship. The study findings indicate that most students have an understanding and awareness of multitasking, but ultimately, whether they believed they could multitask or not, multitasking significantly impeded performance.

Keywords: multitasking, self-efficacy, technology, students, college

Multitasking research has demonstrated that when an individual engages in two or more tasks, simultaneously, performance degrades (Bellur et al., 2015; Carrier et al., 2015; Chen & Yan, 2016; Jamet et al., 2020; Pashler, 1994). The false narrative of students-as-multitaskers, especially in the presence of digital technologies, has been based primarily on anecdotal evidence, self-report, and misconceptions (Kirschner & De Bruyckere, 2017; Ma et al., 2020). Yet, students continue to text and use social media while in lectures, and email and watch videos while completing homework (Burak, 2012; Wammes, 2019). Research at the intersection of student learning and technology-based multitasking has demonstrated that off-task multitasking during class reduces student academic performance (Flanigan & Kiewra, 2018; Fried, 2008; Junco & Cotton, 2012; Lawson & Henderson, 2015), that individual differences in memory performance can mediate the negative impact of technology-based multitasking (Doolittle & Mariano, 2008; Seddon, 2021), and that net gen/millennial/digital native/gen m students are not the rampant multitaskers they are often portrayed to be (Carrier, et al., 2015; Judd & Kennedy, 2011; Kirschner & Bruyckere, 2017; Valtonen et al., 2011). This trifecta of performance degradation, memory mediation, and multitasking engagement, during a time when the influence and impact of digital technology on daily behavior is increasing (Auxier & Anderson, 2021), suggests the importance of student awareness and control over their multitasking and non-multitasking behavior.

Multitasking, Digital Technology, and Performance

With the proliferation of mobile devices and the use of digital technologies in the classroom, opportunities to examine the effects of technology-based multitasking and performance abound. Wood et al. (2012) had students attend a lecture and multitask using social networking software (e.g., Facebook), engaging in productivity software (e.g., word processor), taking notes, or using any technology they wanted. Wood et al. determined that students who engaged in classroom technology-based multitasking performed poorer on a follow-up content measure than students who did not engage in multitasking. Dönmez and Akbulut (2021) examined students in a simulated lecture viewing a biology life-cycle video while simultaneously engaging in chat questions. Dönmez and Akbulut found that whether the chat questions were relevant or irrelevant to the video content, the multitasking group performed poorer on content-focused questions than the non-multitasking no-chat-questions group. Similarly, Wammes et al. (2019) monitored student's technology-based multitasking throughout numerous live classes and found that the use of off-task media increased during the class periods themselves and that students who engaged in more off-task media use performed more poorly on learning tasks than students who engaged in less off-task media.

In addition, Ragan et al. (2014) examined students' technology-based multitasking while using laptops in a live, large enrollment class. They found, through in-class observations, that students using laptops were on task only 37% of the time and off task 63% of the time, mostly engaging with social media, general web browsing, and games. In addition, this technology-based multitasking is present in both face-to-face courses and online courses. Lepp et al. (2019) found that when students participated in an online course, they were significantly more likely to engage in technology-based multitasking – sending text messages, emailing, watching videos, playing video games, and visiting social networking sites – than when they participated in a face-to-face course.

Thus, students are multitasking in class and this multitasking is negatively impacting their academic performance, and while the vast majority of technology-based multitasking research has investigated the impact of multitasking on the multitasker, Sana et al. (2013) and Hall et al. (2020) focused on the impact of multitasking on those seated around the multitasker. Sana et al. created a situation where students watched and took notes during a 45-minute mock, PowerPoint-driven lecture, with some students in view of a technology-based multitasking peer (e.g., web browsing, watching videos, using social media) and some students not in view of a multitasking peer. Students in view of a multitasking peer scored 17% lower on a post-lecture, multiple-choice comprehension test than students not in view of a multitasking peer. Hall et al. (2020) clarified and extended Sana et al.'s (2013) findings by aligning post-lecture comprehension test items with when the multitasking peer was on or off-task (10 questions were addressed when the peer multitasker was on-task, and 10 questions when off-task). Specifically, students watched and took notes (by hand) during a 20-minute mock, PowerPoint-driven lecture, while sitting next to, in front of, or behind a multitasking peer with a laptop (e.g., scrolling through Facebook or Buzzfeed). The multitasking peer with the laptop (a confederate of the researchers) was on-task 50% of the time (taking notes for two 5-minute segments) and off-task 50% of time (browsing for two 5-minute segments). Evaluation of the post-lecture, multiple-choice comprehension test indicated that students scored 9% lower on questions addressed while the multitasking peer was off-task than when on-task. Taken together, Sana et al. (2013) and Hall et al. (2020) demonstrate that the source of multitasking can be someone else's technology and still degrade learning.

Beyond this laptop-based multitasking, use of a cellphone/smartphone during class has also been demonstrated to negatively impact student learning (Chen & Yan, 2016; Froese et al., 2012; Junco & Cotton, 2012; Mendoza et al., 2018; Sumuer, 2021). Kim et al. (2019) determined that college students were actively using their phones approximately 25% of class time, with distractions occurring every 3-4 minutes, while Felisoni and Godoi (2018) also determined that college students used their phones approximately 20% of class time. Kim et al. (2019) and Felisoni and Godoi (2018) both found in-class cell phone use negatively associated with academic performance. Mendoza et al. (2018) had students participate in a 20-minute mock lecture, where some students received four texts from the researcher during the lecture (in addition to any texts the students may have received normally), and some did not. Following the lecture, all students completed a 20-question multiple-choice quiz addressing the lecture content. Mendoza et al. observed the students during the lecture and those who looked at their cellphones, checked their cellphones, or texted from their cellphones as a result of being texted were included in the "distracted" group, the rest of the student were included in the "non-distracted" group. Mendoza et al. found that the distracted students performed significantly more poorly on the post-lecture quiz than the non-distracted students. Finally, Ma et al. (2020) observed students using their cellphones during the course of a semester as "clickers" to complete teacher-led questions. Ma et al. (2020) focused on what students did with their cellphones following their in-class use as clickers and found that 41% of students continued to use their cellphones for non-class purposes (e.g., texting, emailing) immediately following the close of the clicker question, and that 28% of the students continued to use their cellphones for non-class purposes five minutes following the close of the clicker question, leading to an extended multitasking episode following the cellphone's appropriate classroom use as a clicker.

With research demonstrating a decrease in performance when students attempted technology-based multitasking within the academic setting, it is important to examine the processes that guide multitasking behaviors (i.e., self-efficacy), including how and why students are choosing to multitask.

Multitasking and Self-Efficacy

Self-efficacy refers to one's belief in their ability to successfully complete specific tasks or achieve specific outcomes (Bandura, 1977, 1997, 1998; Zimmerman, 2000). Self-efficacy varies from task-to-task, within the same person, thus self-efficacy is seen as primarily domain or task specific, rather than as a general personality trait (Bong & Skaalvik, 2003; Hanss & Böhm, 2010; McAvay, 1996). This domain specificity includes the use of classroom-based technologies (Hatlevik et al., 2018; Saville & Foster, 2021) and multitasking (Brooks, 2015; Sanbonmatsu et al., 2013). In addition, research surrounding the role of students' perceptions of their abilities suggests that when students believe in their abilities, they are more likely to exercise those abilities in attempts to achieve desired outcomes (Alghamdi et al., 2020; Bandura, 1997; Eom & Ashill, 2016; Schunk, 1995; Tsai, Chuang, Liang & Tsai, 2011). Of specific interest, Kirschner and Bruyckere (2017) and Sanbonmatsu et al. (2013) reported that students who have a higher multitasking self-efficacy are more likely to engage in multitasking than student who have a lower multitasking self-efficacy.

While examining multitasking and self-efficacy, Sanbonmatsu et al. (2013) compared undergraduate students' multitasking ability with their multitasking self-efficacy. In this case, multitasking self-efficacy was measured using an indirect, general approach – students were asked to rate their ability to multitask, in general, in comparison to other college students, on a 0 to 100 scale, from *I'm at the very bottom* (0) to *I'm exactly average* (50) to *I'm at the very top* (100). Multitasking performance was also measured using a general approach, the Operation Span (OSPAN) task, a task designed to measure working memory capacity by simultaneously processing (multitasking) basic math statements (e.g., 5 + 3 = ?), while also maintaining basic vocabulary in short term memory (e.g., dog). Sanbonmatsu et al. found general multitasking self-efficacy and general multitasking performance to be statistically unrelated (r = .08). Zhang (2015) also used an indirect measure of multitasking, surveying undergraduate students regarding the degree to which they multitasked with laptops in class (e.g., How often do you multitask with laptops in class?) and a general academic self-efficacy approach (e.g., I'm certain I can understand the ideas taught in this course). Zhang (2015), like Sanbonmatsu et al. (2013), found general multitasking self-efficacy and general multitasking performance to be statistically unrelated (r = -.05). Finally, Pollard and Courage (2017) compared students' multitasking self-efficacy, using the same indirect, general approach as Sanbonmatsu et al. (2013), with their technology-based multitasking performance, reading a short article while attending to a 13-minute TV program. Pollard and Courage, unlike Zhang (2015) and Sanbonmatsu et al. (2013), found general multitasking self-efficacy and technology-based multitasking performance to be statistically related (r = .31, p = .02).

What is lacking from the multitasking and self-efficacy literature is an alignment between a direct measure of technology-based multitasking performance and domain-specific technology-based multitasking self-efficacy. While there are studies addressing indirect measures of technology-based multitasking performance (i.e., surveys; see Wu, 2017; Zhang, 2015) and general measures of self-efficacy (e.g., OSPAN, general academic self-efficacy; see Sanbonmatsu, 2013; Zhang, 2015) there is a lack of evidence addressing direct measures of technology-based multitasking performance and domain-specific multitasking self-efficacy.

One exception is Brooks (2015), who explored the relationship between undergraduate students' multitasking computer self-efficacy (MTCSE, Basoglu et al., 2009) before and after they viewed a 15-minute video. While watching the video, students had the option to engage in several forms of social media. After the video, students completed a seven-question multiple-choice quiz addressing the content of the video. Brooks found that higher multitasking computer self-efficacy did not mediate the negative impact of engaging in social media on performance, that is, whether students had high or low multitasking computer self-efficacy, the use of social media while watching a video still impeded students' retention of the video content.

Research Questions

The current research adds evidence to the questions surrounding the relationship between students' technology-based multitasking abilities and their technology-based self-efficacy. Within this study, for the purposes of measuring students' awareness of the underlying causes of multitasking interference, the term "mental effort" was used to refer to students' cumulative use of cognitive processing resources. This research focus led to five research questions:

1. *Mental Effort Awareness:* Do students understand that various technology-based tasks require differing levels of mental effort to complete successfully?
2. *Multitasking Awareness:* Do students understand that the ability to engage in technology-based multitasking is affected by the levels of mental effort required to complete successfully each task separately?
3. *Multitasking Self-Efficacy:* Do students believe in their ability to engage in technology-based multitasking?

4. *Multitasking Performance:* How well do students perform in a technology-based multitasking environment?
5. *Multitasking Self-Efficacy and Performance:* Is there a relationship between students' belief in their abilities to multitask (self-efficacy) and their actual ability to multitask (performance) in a technology-based environment?

Method

Participants

The participants were 265 undergraduate students (181 males and 84 females) with a mean age of 19.9 years (2.03 SD) from a large research university in the southeastern United States. Participants included 88 freshmen, 76 sophomores, 49 juniors, and 51 seniors. The self-identified ethnicity of the participants included 199 Caucasian/White students, 16 African American/Black students, 27 Asian students, 11 Hispanic students, 9 Multiracial students, 1 Alaskan Native/American Indian and 2 students that listed their ethnicity as "other." All participants were enrolled in an introductory geography course, were recruited via an email sent to all students enrolled in the course (532 students; response rate = 49%), participated voluntarily, and received course credit for participation. Finally, all research methods were approved by the lead author's Institutional Review Board.

Procedures and Materials

Student perceptions of technology-based multitasking mental efforts were examined in two ways. First, a survey was completed that was comprised of 10 mental effort requirement questions related to students' perception of how much mental effort it would take for them to successfully complete a technology-based task (e.g., surfing the web, watching an online video; see Table 1). Second, four multitasking self-awareness questions were constructed on-the-fly related to students' awareness of their ability to multitask when provided with two technology-based tasks simultaneously (e.g., surfing the web AND watching an online video; see Table 2). The 10 mental effort requirement questions and four multitasking self-awareness questions were evaluated based on a 6-point scale: 1 = Not At All, 2 = Very Little, 3 = Not Much, 4 = Some, 5 = Fair Amount, and 6 = Complete/Full. The four multitasking self-awareness questions were based on a student's responses to the 10 mental effort requirement questions. Specifically, after each student evaluated the 10 mental effort requirement questions, the computer was programmed to determine the two tasks that were rated as requiring the most mental effort and the two tasks that were rated as requiring the least mental effort.

Table 1. Student Perceptions of Mental Effort Requirements for Successful Technology-based Task Completion (n = 265).

Tasks	Mean[a,b]	SD
1.Read news or a story online	3.52[c]	1.55
2. Create and send an email	3.10[d]	1.48
3. Engage in an online game	2.90[d,e]	1.70
4. Talk on your cell phone	2.80[e,f]	1.52
5. Watch a video on your computer	2.71[e,f,g]	1.45
6. Surf the web	2.53[f,g,h]	1.33
7. Create and send a text message	2.38[g,h,i]	1.23

8. Listen to music online	$2.21^{h,i}$	1.31
9. Engage with Facebook	2.19^{i}	1.22
10. Conduct a Google/Bing search	2.11^{i}	1.18

[a] 1 = Not at All, 2 = Very Little, 3 = Not Much, 4 = Some, 5 = Fair Amount, 6 = Complete/Full
[b] Means with similar superscripts are statistically similar, means with dissimilar superscripts are statistically different ($p < .01$)

Table 2. Student Perceptions of Technology-based Multitasking Self-Awareness (n = 265).

Multitasking Task	**Mean^{a,b}**	**SD**
1. [highest rated task] AND [second highest rated task]	4.11^{c}	1.77
2. [highest rated task] AND [lowest rated task]	3.42^{d}	1.78
3. [second highest rated task] AND [second lowest rated task]	3.23^{d}	1.68
4. [lowest rated task] AND [second lowest rated task]	2.43^{e}	1.40

[a] 1 = Not at All, 2 = Very Little, 3 = Not Much, 4 = Some, 5 = Fair Amount, 6 = Complete/Full
[b] Means with similar superscripts are statistically similar, means with dissimilar superscripts are statistically different ($p < .01$)

Table 3. Technology-based Multitasking Self-Efficacy Survey (n = 265).

Self-Efficacy Survey Item	**Mean^{a,b}**	**SD**
1. I can successfully multitask while surfing the web.	4.59^{c}	1.56
2. In general, I can successfully multitask in most technology-based situations.	$4.47^{c,d}$	1.66
3. I can successfully multitask while engaging with Facebook.	4.39^{d}	1.49
4. I can successfully multitask while texting.	4.28^{d}	1.53
5. I can successfully multitask while talking on the phone.	4.28^{d}	1.51

[a] 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Somewhat Agree, 5 = Agree, 6 = Strongly Agree
[b] Means with similar superscripts are statistically similar, means with dissimilar superscripts are statistically different ($p < .05$)

The four multitasking self-awareness questions were then constructed and immediately provided to each student such that students were asked, "How much mental effort would it take for you to successfully complete the following tasks, *at the same time*?", where the four task pairs included: (a) highest rated task and second highest rated task, (b) lowest rated task and second lowest rated task, (c) highest rated task and lowest rated task, and (d) second highest rated task and second lowest rated task. Thus, the actual pairs were based on each student's responses and not determined a priori.

In addition, five multitasking self-efficacy questions related to students' ability to multitask in a technology-based environment (e.g., *I can successfully multitask while surfing the web*; see Table 3) were used to measure students' technology-based multitasking self-efficacy. The five self-efficacy questions were evaluated based on a 6-point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Somewhat Agree, 5 = Agree, 6 = Strongly Agree.

Following the completion of the mental effort awareness questionnaire, the multitasking awareness questionnaire, and the multitasking self-efficacy survey, students were randomly assigned to one of two groups, a non-multitasking (non-MT; n = 172) group or a multitasking (MT; n = 93) group. The non-MT group watched a 5 minute and 41 seconds TED video by David Pogue titled and addressing "10 Top Time-Saving Tech Tips" (e.g., in Google type Define+word to get a definition of the word, make the text on a web page larger by pressing Ctrl & +, double click on a word to select the entire word). The video was positioned at the top left of the screen. After watching the video, members of the non-MT group were then asked 10 multiple choice questions focused on details from the video that could not be known without watching the video, for example, "When the speaker is demonstrating how to access pop-up menus, what state does he select?" or "When the speaker was demonstrating how Google could be used to look up the definition of a word, what was the word he looked up?"

The multitasking (MT) group watched the same video in the top left of the screen, but on the rest of the screen, members of the MT group were asked to complete a 4-part questionnaire: Part 1 consisted of nine scaled questions (1 = Strongly Disagree to 6 = Strongly Agree) addressing their perceptions of the class they were taking – their subject interest, their world geography self-efficacy, and the effectiveness of the teacher's instruction; Part 2 consisted of two open-ended questions addressing what they liked best and worst about the class; Part 3 consisted of 15 technologies (e.g., microblogging, videos, bookmarking) for which they indicated if they used the technology at least once, used the technology yesterday, and/or used the technology regularly outside of the class; and, Part 4 consisted of 18 scaled questions (1 = Definitely No to 6 = Definitely Yes) addressing their perceptions of various instructional approaches (e.g., lecture with PowerPoint, using problems in class, using videos in class). A pilot test of 144 undergraduate students revealed an average time to complete the 4-part survey of 6 minutes and 4 seconds (SD = 39.8 seconds), while study participants (N= 265) completed the 4-part survey in an average of 5 minutes and 58 seconds (SD = 34.8 seconds). The video was pinned to the top left of the screen, so while a student scrolled to answer the survey questions, the video always remained visible.

Results

The survey results focus on students' perceptions and understandings regarding the mental effort requirements necessary to complete successfully various tasks, students' awareness of the role of mental effort in multitasking, and the relationship between students' technology-based multitasking self-efficacy and performance. For all subsequent analyses, the Cohen's *d* effect size is defined as large = 0.8, medium = 0.5, and small = 0.2.

Mental Effort Requirement of Task Completion

Do students understand that various technology-based tasks require differing levels of mental effort to complete successfully? As a measure of students' awareness of task mental effort requirements, students were asked to rate the mental effort necessary to successfully complete a variety of technology-based tasks (e.g., create and send an email, engage with Facebook, Read news or a story online). A repeated measures ANOVA with a Greenhouse-Geisser adjustment was conducted involving students' ratings of the 10 tasks (Cronbach's alpha = .92) revealing the existence of a significant main effect for mental effort requirements, $F(9,1658) = 58.19$, $d = 0.93$, $p < .01$ (see Table 1). A series of post-hoc comparisons using the Bonferroni adjustment revealed that *read news or a story online* was perceived as requiring the greatest amount of mental effort when compared to the remaining tasks, while *conduct a Google search* and *engage with Facebook* were perceived as requiring the least amount of mental effort. Of particular interest regarding these findings is the indication that students were aware that different technology-based tasks required differing levels of mental effort in order to complete the tasks successfully.

Multitasking Self-awareness

Do students understand that the ability to engage in technology-based multitasking is affected by the levels of mental effort required to successfully complete each task separately? As a measure of students' technology-based multitasking self-awareness, students were asked to rate the mental effort necessary to successfully complete two technology-based tasks simultaneously. A repeated measures ANOVA with a Greenhouse-Geisser adjustment was conducted based on four pairings (Cronbach's alpha = .80) of the mental effort requirement tasks – highest rated task and second highest rated task, lowest rated task and second lowest rated task, highest rated task and lowest rated task, and second highest rated task and second lowest rated task – resulting in a significant main effect for technology-based multitasking self-awareness, $F(3,744) = 90.62$, $d = 1.17$, $p < .01$ (see Table 2). A series of post-hoc comparisons using the Bonferroni adjustment indicated that students perceived that multitasking involving the two highest rated technology-based tasks would require the greatest amount of mental effort, while multitasking involving the two lowest rated technology-based tasks would require the least amount of mental effort. Ultimately, these findings indicate that students were aware that the mental effort required to engage in technology-based multitasking is influenced by the mental effort required to complete the technology-based tasks individually.

Technology-based Multitasking Performance and Self-Efficacy

Can students successfully engage in technology-based multitasking? Students in the non-multitasking (non-MT) group watched a 5 minute and 41 second video followed by the completion of 10 multiple-choice questions addressing the video content, and students in the multitasking group (MT) watched the same video while completing a four-part survey, followed by the same 10 multiple-choice questions. A t-test was computed between the non-MT group ($M = 8.45$, $SD = 1.52$) and the MT group ($M = 4.66$, $SD = 2.22$), resulting in a significant group difference, $t(263) = 16.35$, $d = 2.10$, $p < .01$. Thus, the non-MT group significantly outperformed the MT group with regard to performance on the post-video evaluation.

Do students believe in their ability to engage successfully in technology-based multitasking? Students were provided with a standard 5-item scaled survey addressing technology-based multitasking self-efficacy (see Table 3; Cronbach's alpha = .87). The five items were averaged into a single composite technology-based multitasking self-efficacy score for each student, a grand composite mean, across all students, was calculated at $M = 4.39$ ($SD = 1.04$), mid-way between *Somewhat Agree* and *Agree*. In addition, self-efficacy composite scores were compared between the non-MT group ($M = 4.44$, $SD = 1.03$) and the MT group ($M = 4.27$, $SD = 1.07$) resulting in no significant difference, $t(263) = 1.26$, $d = .16$, $p = .20$. Thus, there was no significant difference between the non-MT and MT groups with regard to technology-based self-efficacy.

Finally, is there a relationship between students' belief in their abilities to successfully engage in technology-based multitasking (self-efficacy) and their actual ability to engage in technology-based multitasking (performance)? This question was answered using a Pearson correlation using data from only the MT group. This correlation compared the multitasking performance (scored 0-10 based on students' post-video multiple-choice test) and multitasking self-efficacy (scored 1-6 based on the composite technology multitasking self-efficacy scores). The Pearson correlation of multitasking performance to multitasking self-efficacy was $r = .03$, $p = .55$, indicating the lack of a relationship between technology-based multitasking self-efficacy and technology-based multitasking performance.

Discussion

There is a substantial research base demonstrating that technology-based multitasking in college classes impairs learning and performance. That has not, however, stopped students from engaging in technology-based multitasking. Is it possible that students who believe they can successfully multitask, actually can? To explore the relationship between technology-based multitasking self-efficacy and performance, students completed a technology-based multitasking perceptions questionnaire, a video + survey multitasking task (multitasking group) or a video-only non-multitasking task (non-multitasking group), and a technology-based self-efficacy survey. Students indicated that they were aware that different technology-based tasks required differing levels of mental effort, and that multitasking with these technology-based tasks also required differing levels of mental effort. Students also indicated that they *somewhat agreed* to *agreed* that they could successfully engage in technology-based multitasking, however, students' actual technology-based multitasking performance was not as successful. Overall, non-multitasking students outperformed multitasking students almost two-to-one, and there was no significant correlation between students' technology-based multitasking self-efficacy and their technology-based multitasking performance. When it comes to technology-based multitasking, it is clear that whether students think they can or think they can't, they can't.

These results align with the broad findings that multitasking reduces academic achievement performance (Dontre, 2020; Downs et al., 2015; Jamet et al., 2020; Junco & Cotton, 2011; Koch et al., 2018), as well as the findings that there is no relationship between multitasking self-efficacy and multitasking performance (Brooks, 2015; Sanbonmatsu et al., 2013; Wu, 2017; Zhang, 2015). Is all hope lost, then, when it comes to technology-based multitasking in the classroom? Are students destined to be in-class technology-based multitaskers, thus negatively influencing their academic performance? Perhaps not.

Alvarez-Risco et al. (2021) in a survey of university students regarding their propensity to engage in academic multitasking (technology-based multitasking in class), their academic self-efficacy (self-efficacy for self-regulated learning), and their academic performance, found a negative relationship between academic multitasking and academic self-efficacy. That is, students with higher academic self-efficacy engaged in less academic multitasking, which was associated with higher academic achievement. The finding that students with higher academic self-efficacy tend to multitask less (see also Alghamdi et al., 2020; Calderwood et al., 2014; Lepp et al., 2019; Zhang, 2015) indicates an awareness of the mental effort requirements to multitask and the subsequent impact on academic performance, a finding supported in the current study. In addition, Downs et al. (2015) found that students' multitasking self-efficacy decreased following poor exam performance when distracted by social media (e.g., Facebook). Thus, while there may be no relationship between technology-based multitasking self-efficacy and performance, awareness of the impact of technology-based multitasking on performance may lead to a reduction in self-efficacy, which may then lead to a reduction in multitasking.

Ultimately, the current study concludes that students are intuitively aware of the underlying cause of poor multitasking performance and that their beliefs in their abilities to multitask in not related to their actual ability to multitask. Given the robust findings that multitasking in class leads to less learning, it is imperative that students possess a realistic understanding and self-perception of their multitasking abilities so as not to impede their learning.

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