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Investigating factors that influence conventional distraction and tech-related distraction in math homework

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ABSTRACT

This study examined high school students' distractions in math homework. A confirmatory factor analysis was conducted on the scores of six items regarding conventional and tech-related distractions. Data revealed that conventional and tech-related distractions were empirically distinguishable. Two multilevel models were performed, with each type of distractions as the dependent variable. Both types of distraction were negatively related to four student-level variables (homework effort, homework environment, learning-oriented reasons, and value belief). In addition, both were positively related to three student-level variables (time on videogame, peer-oriented reasons, and time on homework) and one class-level variable (time on homework). Meanwhile, tech-related distraction was positively associated with parent education, whereas conventional distraction was negatively associated with expectancy belief, affective attitude, and grade level.

1. Introduction

Although distraction frequently occurs during goal-oriented academic activities (Schmitz & Wiese, 2006; Wolters, 2011), it becomes more of a concern when students are required to complete academic tasks during after-school hours. This is particularly the case for homework, as it occurs in the middle of competing (often more appealing) activities (e.g., television, sports, and extracurricular activities), with less supervision, structure, and time constraints than in-class study (Cooper, Robinson, & Patall, 2006; Wolters, 2011; Xu, 2004).

Adding to this concern is the fact that the increased prevalence of new media (e.g., IPad, laptop, smart phone, and tablet) presents a profound new challenge of shielding academic goal striving (i.e., completing homework) from unwanted distractions (Calderwood, Ackerman, & Conklin, 2014; Griffin, 2014; Richtel, 2010; Wallis, 2006). Yet, in spite of research showing that distraction has an adverse effect on task completion, knowledge acquisition, application, and academic performance (Hsu, Babeva, Feng, Hummer, & Davison, 2014; Jacobsen & Forste, 2011; Junco & Cotten, 2011), there have been few attempts to systematically investigate models of factors that influence homework distractions. The present investigation attempts to fill this gap in research on homework distraction.

2. Theoretical framework

Students' engagement and persistence on goal-directed academic tasks (e.g., homework) often demand the use of volitional control to guard against distractions and aid task completion (Boekaerts & Corno, 2005; Corno, 2004; McCann & Turner, 2004). Volitional control is concerned mainly with issues of implementation that take place once a goal is set, to maintain the needed focus and effort to pursue that goal, and to protect the attention to follow through that goal in the face of various alluring temptations and competing personal striving (Boekaerts & Corno, 2005; Corno, 2004).

Research and theorizing on volitional control suggest that volitional control may be affected by multiple variables. First, volition control is characterized by self-regulatory activities of persistent and purposive striving (e.g., structuring the workspace, bypassing barriers, and staying focused; Corno, 2004). Thus, volitional control to protect against homework distractions may be influenced by students' initiative in arranging their homework environment as well as their effort invested in completing homework.

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In their study on the importance of volition in the learning process, Garcia, McCann, Turner, and Roska (1998) explicitly linked the expectancy-value theory (e.g., task value; Eccles, 1983) to intention formation, implementation, and protection. They posited that volitional control is affected by the enjoyment students experience while working on an academic task and utility value of the task. Informed by the expectancy-value theory, Warton (2001) stated the critical role of perceived task value in task completion, including (a) task interest (whether homework is viewed as interesting), (b) task importance and utility (the importance and usefulness of homework in fulfilling a number of goals), and (c) task cost (perceived opportunity costs resulting from doing homework, such as restricting time available for sports, extracurricular, and leisure activities). Therefore, volitional control to guard against homework distractions may be further affected by task value, including task interest, task importance and utility, and task cost.

Furthermore, according to the expectancy-value theory (Eccles, 1983; Eccles & Wigfield, 2002), individuals are more likely to engage in an academic task if they believe they can be successful in performing the task (i.e., expectancy belief). Thus, individuals' use of volitional control to inhibit homework distractions may be also influenced by their expectancy for successfully completing homework.

Taken together, this body of literature suggests that homework distractions may be affected by a range of factors (e.g., take value, value expectancy, homework environment, and homework efforts). Therefore, there is a need to include these variables in models of homework distractions.

3. Studies pertaining to homework distractions

One line of literature finds that students continue to struggle with homework distractions well into the high school years and beyond (Benson, 1988; Cooper, Lindsay, & Nye, 2000; Pool, Koolstra, & van der Voort, 2003; Xu & Corno, 1998). These homework distractions have existed for a long time, including television; phone calls; pets wanting attention, barking, climbing on furniture, or being noisy; family visitors; siblings moving into and out of the study areas teasing or initiating questions; background yelling, conversations, and crying (e.g., small babies); disturbance from doorbells, washing machines, or vacuum cleaners; noise from stereos, radios, tape players, or musical instruments; feelings of tiredness and restlessness; and playing other things during a homework session (e.g., a cup or a toy).

Over the last decade, the ever-present new media technology presents expanding webs of distraction to focusing and learning, with homework in particular (Calderwood et al., 2014; Dietz & Henrich, 2014; Foehr, 2006; Richtel, 2010; Sana, Weston, & Cepeda, 2013; Xu, 2008a). Based on media diary data from 694 students in grades 3–12, The Kaiser Family Foundation (Foehr, 2006) found that students were frequently doing something else (65% of the time) when their primary activity was doing homework on the computer. Interestingly but not surprisingly, 50% of the time doing homework on the computer as their primary activity was using another media (e.g., text messaging, surfing websites, using e-mail, and playing computer games and video games).

Using time-diary and survey data from 1026 university students, Jacobsen and Forste (2011) investigated their electronic media use, including social-networking sites, cell phone, texting, and e-mail. The study found that about two-thirds of the students (62%) used some type of nonacademic electronic media while attending class, studying, or doing homework. It also found that electronic media use was negatively related to academic performance. Thus, many students are now “wired for distraction” (Richtel, 2010).

New media technology may be more distracting, because of its motion and visual attraction (Griffin, 2014) and its seamless integration or intrusion of work, play, and social interaction (David, Kim, Brickman, Ran, & Curtis, 2014). In the case of homework, using technological devices may be more appealing, tempting, and distracting. Students' experience of homework are found to be predominantly negative. Compared with their experiences with classwork and other after-school activities, students tend to have low affect, motivation, and attention while completing homework (Leone & Richards, 1989; Shernoff & Vandell, 2007; Verma, Sharma, & Larson, 2002). Thus, using technological devices presents an easy outlet for coping with negative experience and boredom during homework completion (Calderwood et al., 2014), especially for “multitasking generation” (Wallis, 2006). An ongoing text exchange with a friend, for example, can be an appetitive activity that induces positive affect that offsets the boredom of homework (David et al., 2014).

Another body of literature finds that several variables may influence homework distractions, including homework environment (Xu, 2010; Xu & Corno, 2003), student attitude (Calderwood et al., 2014; Cooper, Lindsay, Nye, & Greathouse, 1998; Xu, 2008a), and student characteristics (David et al., 2014; Xu, 2010). For example, Xu (2010) examined multilevel models of homework distraction, based on survey data from 969 students in grade 8 (52 classes) and 831 students in grade 11 (45 classes) in US. At the individual level, homework distraction was negatively related to affective attitude ($b = -.22$, $p < .01$), homework environment ($b = -.20$, $p < .01$), academic achievement ($b = -.08$, $p < .01$), learning-oriented reasons ($b = -.08$, $p < .05$), homework interest ($b = -.07$, $p < .05$), and adult-oriented reasons ($b = -.06$, $p < .05$). Males, compared with females, reported statistically significant lower levels of homework distraction ($b = -.30$, $p < .01$). On the other hand, those students who spent more time on television ($b = .15$, $p < .01$), extracurricular activities ($b = .10$, $p < .01$), sports ($b = .06$, $p < .01$), and paid jobs ($b = .05$, $p < .05$) reported that they were more likely to be distracted while doing homework. In addition, homework distraction was positively related to peer-oriented reasons ($b = .10$, $p < .01$).

At the class level, students in grade 11 (compared with students in grade 8) were more likely to be distracted while doing homework ($b = .13$, $p < .05$). Overall, these variables explained 25.2% of the variance in homework distraction at the individual level, 77.7% of the variance at the class level, and 28.3% of the total variance.

In another related study, Calderwood et al. (2014) examined the homework distractions and media multitasking (e.g., non-homework related computer e-mail, Internet activities, and cell phone use) among 60 undergraduate students, based on data from a three-hour solitary homework session in a laboratory environment. The study linked homework distraction frequency and duration to negative and positive affect (i.e., the experience of positive or positive mood states), subjective fatigue (i.e., feelings of fatigue, sluggishness, stiffness or strain in neck or eyes), homework task motivation (i.e., motivation or effort to perform well on homework tasks), and self-efficacy (i.e., the confidence to concentrate on homework activities in the next hour). The results from zero-order correlations indicated homework distractions were negatively associated with homework task motivation and self-efficacy, but positively associated with negative affect.