Peers and Instructors as Sources of Distraction from a Cognitive Load Perspective

Brandi N. Frisby[1], Benson T. Sexton[2], Marjorie M. Buckner[3], Anna-Carrie Beck[4], and Renee Kaufmann[5]

[1]University of Kentucky, [2]Lindsey Wilson College, [3]Texas Tech University, [4]Coastal Carolina Community College, [5]University of Kentucky

(Received 31 August 2017; Accepted 25 April 2018)

Framed by literature regarding classroom interactions that affect students' cognitive processing, this study provided an integrative approach to understanding distracting instructor and student communication. Participants qualitatively reported on either a distracting peer (n = 90) or instructor (n = 127). The responses were coded using anti-citizenship behaviors and instructor misbehaviors. One additional category emerged that extends the instructor misbehavior literature. Participants completed a new distraction scale and a cognitive load scale. Our results revealed differences in frequencies for each behavior, but all instructor and student behaviors were equally distracting and had similar negative influences on students' cognitive load. Implications for instructors to manage these distracting behaviors are discussed.

INTRODUCTION

Higher education instructors are teaching in an atmosphere that has been described as the "age of distraction" (O'Donnell, 2015, p. 187) and a "culture of distraction" (Kane, 2010, p. 375). Classroom distractions are those behaviors that challenge the attention, focus, and information processing of students. Because the college classroom is fraught with opportunities for distractions, students' abilities to process course information is influenced, often negatively. Learners' cognitive processing capacity is limited, especially when difficult content is presented through poor instruction (Sweller, 1988) or when peers distract from the learning process. As a result, distracted students' abilities to process content and construct schema is hampered (Sweller, van Merrienboer, & Pass, 1998). Further, although some behaviors are described as distracting, distraction has not been effectively operationalized in extant literature. Thus, this study is guided by three goals: (a) develop a typology of instructor and student distractions, (b) develop and validate a distraction measure, and (c) examine behaviors for their level of distraction and influence on students' cognitive load.

LITERATURE REVIEW

Classroom distractions can manifest in many forms. Previous scholars have examined loud side conversations, confrontational behaviors, compulsively communicating, cheating, allowing cell phones to ring, student challenge behaviors, student misbehaviors, and off task behaviors as distracting (Boice, 1996; Campbell, 2006; Fried, 2008; Johnson, Claus, Goldman, & Sollitto, 2017; Kearney, Plax, Sorensen, & Smith, 1988; McCroskey & Richmond, 1993; McPherson & Liang, 2007; Simonds, 1997). Similarly, and perhaps most popular in the literature, students and instructors are highly susceptible to distractions via social media and technology use (Elder, 2013; Kuznekoff, Munz, & Titsworth, 2015; McCoy, 2013; Sana, Weston, & Cepeda, 2013; Qian & Li, 2017). Distracting behaviors are often attributed to students, but instructors have the potential to create distractions as well. For example, instructor disclosures that are negative, irrelevant, occur too frequently, contain intimate or sensitive information, or are otherwise perceived by students as inappropriate may distract students from focusing on course or learning objectives (Sidelinger, Nyeste, Madlock, Pollak, & Wilkinson, 2015; Zhang, Shi, Tonelson, & Robinson, 2009). Thus, this study examines both students and instructors as sources of distraction in the college classroom.

Students: Anti-Citizenship Behaviors as Sources of Distraction

Many of the student behaviors that are deemed distracting also emerged in Myers et al.'s (2015) study on classroom anti-citizenship behaviors. Simply put, Myers et al. (2015) defined classroom anti-citizenship behaviors as intentional behaviors that disrupt the classroom. They argued that:

> all students in the classroom can be affected by anti-citizenship classroom behavior—whether it be the students who engage in this behavior, the students who witness this behavior, or the students who are the direct targets of this behavior—and can become distracted by it (p. 236).

In their study, four primary categories emerged including physical (e.g., fidgeting, arriving late), participatory (e.g., jokes, participation level), technology (e.g., using computers, phone noises), and etiquette (e.g., side conversations, eating). When peers engage in distracting behaviors, students report sub-optimal outcomes including feeling distracted or becoming angry at peers (Galanes & Carmack, 2013). Myers et al. (2015) found that these anti-citizenship behaviors were negatively related to affective learning, perceived cognitive learning, state motivation, and communication satisfaction. Further, distracting behaviors disrupt the learning environment and may be initiated by or negatively impact both students and instructors (Hirschy & Braxton, 2004; Seidman, 2005). Thus, students may not feel as connected to other students. For example, Johnson (2013) identified negative relationships between a connected classroom climate and distracting texting. In addition to a negative classroom environment, research has also demonstrated links to decreased student learning (Kuzenkoff et al., 2015; Kuzenkoff & Titsworth, 2013; Sana et al., 2013). Yet, the link between distraction and changes in learning has not been fully explored. Thus, there are two primary critiques of the distraction literature including (a) a lack of focus on instructors as sources of distraction and (b) missing operationalization of distraction.

https://doi.org/10.20429/ijsotl.2018.120206

Instructors: Misbehaviors as Sources of Distraction

Instructor misbehaviors, or "any instructor classroom behavior that interferes with instruction and learning," may also distract students (Goodboy & Myers, 2015, p. 133; Kearney, Plax, Hays, & Ivey, 1991). In the seminal misbehaviors study, Kearney et al. (1991) identified three primary categories of instructor misbehaviors including incompetence, indolence, and offensiveness. In an effort to update this line of research, Goodboy and Myers (2015) replicated the study and identified three categories of instructor misbehaviors: antagonism, lectures, and articulation. Goodboy and Myers note that not all of the behaviors identified were actually misbehaviors in the sense that they actually detracted from the classroom or learning. Thus, distraction may only constitute one facet of instructor misbehaviors. Though related, we argue that distracting behaviors and instructor misbehaviors may comprise separate and distinct constructs. An instructor distracting behavior is a behavior that (a) directs students' attention away from course content and (b) detracts from student learning, therefore offering a possible explanation for *why* instructor misbehaviors negatively affect learning.

A comprehensive typology of distracting behaviors from both students *and* instructors would be beneficial. Given the evidence that suggests instructors and students co-construct the classroom environment (Galanes & Carmack, 2013; Sidelinger & Booth-Butterfield, 2010) and Boice's (1996) argument about uncivil and potentially distracting behaviors, that students and teachers are "partners in generating and exacerbating" (p. 458), it is important to examine distracting behaviors from both sources to understand how they contribute to the overall classroom environment. Without a clearer conceptualization of which student and instructor behaviors forestall students' attention and focus when learning, instructors are unable to identify and avoid or correct distracting behaviors, either that they exhibit or that their students may exhibit. Hence, related to the first two critiques, we posed the following two research questions:

> RQ1: Which peer behaviors reported by students as incivilities are also distracting in the classroom?
>
> RQ2: Which instructor (mis)behaviors do students report are also distracting in the classroom?

Because distracting behaviors may challenge the attention, focus, and information processing of students, cognitive load theory is an appropriate theoretical lens framing this study.

Distraction and Cognitive Load

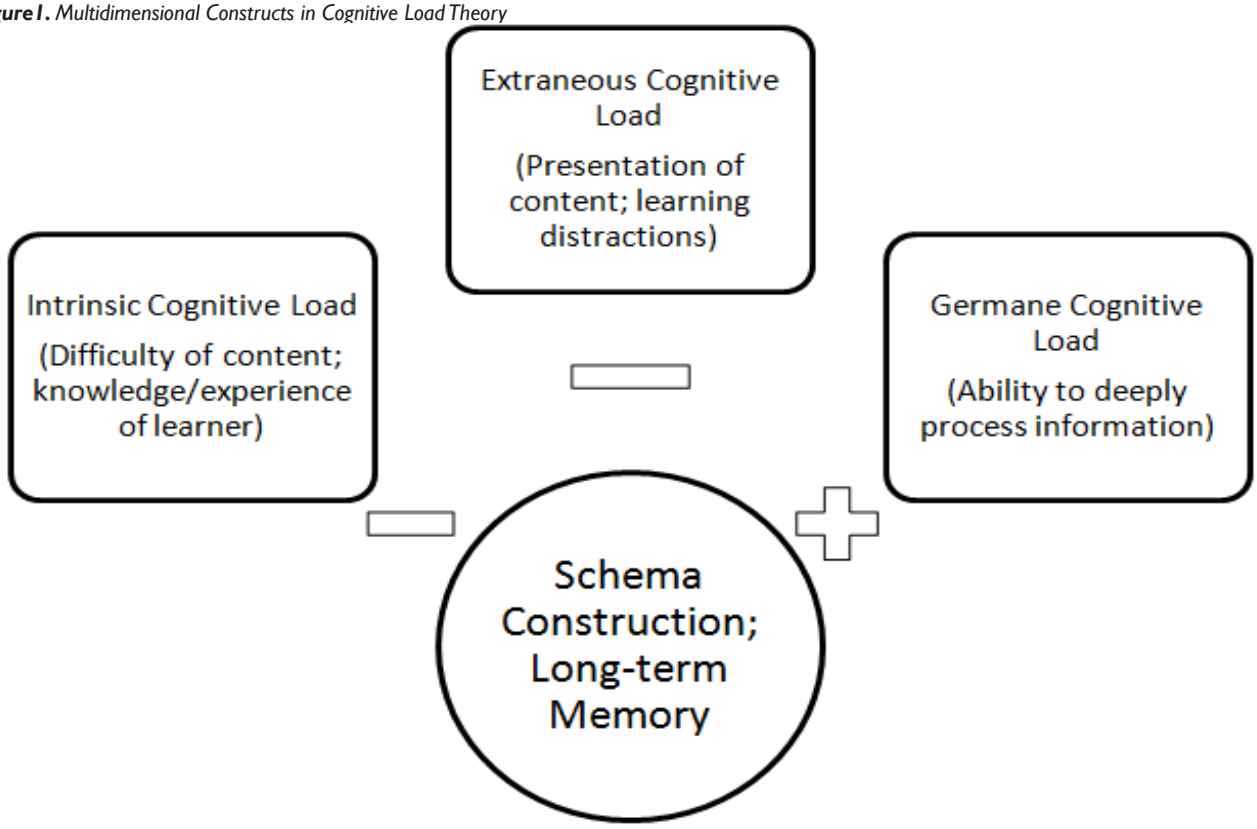
Cognitive load theory (CLT) is a foundational theoretical framework in educational psychology that explores instructional factors influencing learners' cognitive processing capabilities. CLT deals with the capacity of learners' working memory where information is processed, stored, and retrieved in/from long-term memory (van Merrienboer & Sweller, 2005; Pass, Tuovinen, Tabbers, & van Gerven, 2003) and examines the way learners' cognitive resources are focused and used in instructional settings (Chandler & Sweller, 1991). Distractions influence the learning environment and may lead to unnecessary cognitive load, consequently shifting students' focus away from desired information.

Cognitive load refers to the mental strain (negative load) or intentional processing of information (positive load) by learners based on the difficulty of the content being learned, presentation of the content, and/or the learner's effort to deeply process information and construct schema (Pass, Renkl, & Sweller, 2003). It is a multidimensional construct consisting of three types of mental load (See figure). First, intrinsic cognitive load represents difficulty of the content and the previous experience and/or knowledge the learner may have with the content/subject (Pass et al., 2003). Second, extraneous load is the way in which information is presented. It is imposed and/or reduced strictly by an instructor's teaching strategies or poor instruction (Chandler & Sweller, 1991; Jong, 2010; Sweller, 1988). Similarly, we argue that peer behaviors can also create extraneous load that prevents students from fully processing the course content. Third, is germane cognitive load. Unlike intrinsic and extraneous cognitive load, germane cognitive load is considered positive because it describes deeper processing of information and information storage. In fact, increased germane cognitive load should be the instructor's goal for all their students as it is the capacity a learner has to deeply process content after accounting for intrinsic and extraneous cognitive loads (Sweller et al., 1998).

Cognitive load influences instructional climates and learning outcomes. For example, instructors should seek to use mixed work examples with conventional problems to help learners' mentally integrate content (Chandler & Sweller, 1991), use simple-to-complex problems (van Merrienboer & Sweller, 2005), offload information into different communication channels (Mayer & Moreno, 2003, 2010), avoid non-essential and confusing information, and stimulate instructional processes that lead to conceptually rich and deep knowledge (Jong, 2010). Recently, instructional communication scholars explored the influence of instructor clarity on students' ability to deeply process information. Specifically, student learning is maximized under conditions of high instructor clarity and high learner motivation to process content (i.e., reducing cognitive load; Bolkan 2015; Bolkan, Goodboy, & Kelsey, 2016). Additionally, perceived message content relevance and cognitive load influences both academic performance and perceived cognitive learning (Sexton, 2017). Thus, positive instructor behaviors (e.g., clarity, relevance) have promising effects on cognitive load and student learning outcomes. Conversely, distractions may increase extraneous load, reducing students' capacity for deep processing of information, rendering distractions detrimental to climate and learning.

While many of these student and instructor behaviors are assumed or anecdotally reported to be distracting, scholars have yet to measure the extent to which each behavior *is* distracting. For example, Goodboy and Myers (2015) and Kearney, Plax, Hayes, and Ivey (1991) measured frequency of instructor misbehaviors, and Kuzenkoff and Titsworth (2013) manipulated the frequency of texts or posts participants received during a video lecture. Yet, each of these studies did not measure the perceived level of distraction, and research is void of an instrument to measure classroom distraction. Though some measures gauge distraction of a specific behavior (e.g., cell phone distractibility scale, Elder, 2013), an instrument that measures distraction as a response to diverse behaviors, and from multiple sources, would be useful. A general classroom distraction measure was developed as part of a previous study (see scale development and pilot testing section). The current study seeks to validate this measure by testing (a) factorial validity and (b) concurrent validity. Factorial validity refers to the extent to which scale items' factor loadings

Figure 1. *Multidimensional Constructs in Cognitive Load Theory*



are consistent with a theoretically expected factor solution and extant empirical studies (Gefen & Straub, 2005). Thus,

> RQ3: Does the classroom distraction scale demonstrate adequate model fit?

Concurrent validity refers to the extent an instrument is associated in a logical manner to other established instruments that measure similar constructs (Cronbach & Meehl, 1995). Because we argue that distraction increases negative cognitive load, we propose to test concurrent validity:

> H1: Classroom distraction and cognitive load will be positively correlated.

Finally, it is unclear to what extent particular behaviors are distracting or disrupt cognitive load. Distracting behaviors take students' attention away from course content and/or instruction, causing them to lose focus. It is possible that some distracting behaviors are *more* distracting and create greater experienced negative cognitive load than others, ultimately creating a barrier to learning. Further, while extant research focuses on extraneous cognitive load as being imposed by the instructor and poor instruction, it is possible that peer distractions impede on experienced cognitive load as well. Therefore:

> RQ4: What are the differences in (a) perceived distraction and (b) cognitive load for each of the student and instructor behaviors identified?

METHOD

Distraction Scale Development and Pilot Testing

The classroom distraction scale was created by the first author for another study, which served as a pilot study of the new instrument. The items were generated after reviewing the literature and developed to demonstrate face validity. The 7-point semantic differential scale included five items: is distracting – is not distracting, kept me focused – made me lose focus, sidetracked me – did not sidetrack me, got my attention – did not get my attention, detracted from class – did not detract from class. It was tested using an exploratory factor analysis (EFA) with participants including both students (N = 201) and instructors (N = 64). Criteria for factor and item retention were: 1) eigenvalues greater than 1.0 for retained factors, 2) primary factor loadings of .50 or greater, 3) no secondary factor loading exceeding .30, 4) loading on a factor with a minimum of two items, and 5) theoretical interpretability (Comrey & Lee, 1992). In the student sample, EFA revealed that four of the five items loaded on the same factor with loadings of .80 or higher and accounted for 54.94% of the variance (eigenvalue = 2.74). That is, these 4 items were measuring the same intended construct of distraction. Item 4 (got my attention – did not get my attention) was not retained due to low factor loading which indicated it did not measure the same construct as the other four items. The scale was reliable (α = .85, M = 4.48, SD = 1.44). In the instructor sample, EFA revealed that the same four items loaded on one factor with factor loadings of .73 or higher and accounted for 54.10% of the variance (eigenvalue = 2.70). The final 4-item scale was reliable (α = .75, M = 21.56, SD = 5.25). Thus, the final scale was a four item, reliable, and unidimensional scale.

Recruitment and Data Collection Procedures

After receiving institutional review board approval, participants (*N* = 218) were recruited from a general education course required of all students at a large southeastern university to ensure diverse representation of students. Students completed an online survey hosted by Qualtrics for minimal course credit. The online survey included both quantitative and qualitative components. Students were randomly assigned by Qualtrics to report on either a distracting peer (*n* = 90) or distracting instructor (*n* = 127). When first accessing the survey, participants reported on the class they had prior to completing the survey to ensure diversity of courses and instructors represented (Plax, Kearney, McCroskey, & Richmond, 1986) and completed the cognitive load measure about their experiences in that class in general. Then, they responded to the following prompt which was modified to focus on either another student *or* instructor: "Please describe a time when a **student/instructor** in the class you previously identified did or said something that distracted you from class content." Students then completed the distraction measure regarding the recalled incident and completed the cognitive load measure, which was modified to be specific to the day the distraction occurred.

Participants

For students reporting on an instructor distraction, they were all enrolled as full time students and ranged in age from 18 to 28 (*M* = 18.48, *SD* = 1.20). This subsample included 49 males and 78 females who were primarily first year students (*n* = 109, 84.5%). For those reporting on instructor distracting behaviors, the students reported on 67 male instructors and 58 female instructors (2 did not specify instructor sex) in classes ranging in size from 10 to 600 (*M* = 99.30, *SD* = 111.70). Of the instructors, the majority were faculty members (*n* = 94), followed by graduate students (*n* = 15), and 16 students did not know the status of their instructor while 2 chose not to report on the status of their instructor.

For students reporting on a peer distraction, the majority were full-time students (*n* = 87, 96.7%), with one reporting as other and two not reporting their enrollment status. The participants ranged in age from 18 to 23 (*M* = 18.71, *SD* = 1.13). This subsample included 41 males and 48 females, and one who did not report on sex. These students were primarily first year students (*n* = 73, 81.1%).

DATA ANALYSIS

Qualitative Coding. The first author read the qualitative responses and created a codebook for distracting peer behaviors and for instructor behaviors. For the instructor distracting behaviors, the instructor misbehaviors typologies (Goodboy & Myers, 2015; Kearney et al. 1991) were used as sensitizing frameworks. Based on sample misbehaviors and conceptualizations, Kearney et al.'s categories of indolence and incompetence were combined with Goodboy and Myers' category of lectures as they all indicated a general lack of teaching skills. Next, Kearney et al.'s category of offensiveness was combined with Goodboy and Myers' category of antagonism. The fourth and fifth authors coded the entire data set. Of the instructor sample (*n* = 127), 45 students could not recall a time when their instructor had distracted them resulting in 84 responses (66% of the sample) that were able to be coded into extant instructor misbehavior categories (Goodboy & Myers, 2015; Kearney et al., 1991) including incompetence/indolence/lectures (*n* = 72) and offensiveness/antagonism (*n* = 5). Only 7 of the accounts did not clearly fit into previous instructor misbehavior categories; they comprised a new code we labeled *classroom management strategies*, as they did not pertain to lecturing or incompetence and were not offensive or antagonistic. Goodboy and Myers (2015) category of articulation did not emerge in our data set. Intercoder reliability was calculated using Hayes K Alpha in SPSS, which as described by Hayes (2007), provides a reliability estimate for coder judgements and accounts for agreement by chance. Generally, acceptable K alpha levels are above .80. K alpha was .91 for instructor behaviors.

For student distracting behaviors, the anti-citizenship behaviors scale (Myers et al., 2015) was used as a sensitizing framework for code creation. All of the student behaviors were able to be coded into one of the four anti-citizenship behaviors categories (i.e., physical, technology, participatory, or etiquette). No new behaviors or themes emerged. Thus, the student distracting behaviors will be referred to as anti-citizenship behaviors (ACBs) for the results and discussion. K alpha was .81 for student behavior coding.

Quantitative Data

Classroom Distraction. The final scale was a 7-point semantic differential scale including four items: is distracting – is not distracting, kept me focused – made me lose focus, sidetracked me – did not sidetrack me, detracted from class – did not detract from class. In this study, the scale was reliable (.90, *M* = 3.32, *SD* = 1.73) for the students who reported on instructor distractions and for those who reported on peer distractions (.89, *M* = 4.38, *SD* = 1.79).

Cognitive Load. Cognitive load was measured twice using the previously reliable cognitive load questionnaire (Shadiev, Hwang, Huang, & Liu, 2015). Four items (i.e., Learning the materials is easy, Completing learning activities is easy, Learning the materials do not require a lot of mental effort, and Completing learning activities do not require a lot of mental effort) are measured on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The items were recoded so that a high score indicates high cognitive load. The first administration asked students to consider the class they were reporting on in general (e.g., "In general, learning the materials in this class is easy"). The second administration occurred after students described the distraction on that particular day (e.g., "On that particular day, learning the materials was easy"). The cognitive load scale was reliable at baseline administration (.89, *M* = 2.61, *SD* = 1.02) and at the second administration (.92, *M* = 2.60, *SD* = 1.05) for the students who reported on instructor distractions. For students reporting on peer distractions, the baseline cognitive load (.87, *M* = 2.65, *SD* = 1.03) and post-distraction cognitive load (.91, *M* = 2.75, *SD* = 1.06) were both reliable. We created a cognitive load change score (i.e., post-cognitive load subtracted from baseline/pre-cognitive load). A negative change score indicates cognitive load increased, 0 indicates no change, and positive scores indicate a decrease in cognitive load. Change scores were used in all analyses.

RESULTS

RQ 1 and 2 asked about the distracting behaviors of peers and instructors. The majority of instructors did engage in distracting behaviors (n = 84) compared to only 45 who did not. The most commonly identified distracting behavior was incompetence/indolence/lectures followed by offensiveness/antagonism, and classroom management tactics. See Table 1 for the distracting instructor behaviors, frequencies, examples, and descriptive statistics related to distraction and cognitive load.

Similarly, the majority of students were able to report on peers' ACBs (n = 68) compared to only 14 who could not identify an ACB behavior. The most commonly identified ACB was etiquette (n = 29), followed by technology (n = 22), physical (n = 9), and participation (n = 8). See Table 2 for the ACBs, frequencies, examples, and descriptive statistics related to distraction and cognitive load.

Because the EFA from two different pilot study samples supported a reliable, 4-item, unidimensional structure, we used confirmatory factor analysis (CFA) to answer RQ3 which inquired about distraction scale validity and model fit. We conducted CFAs on each sample separately. In the sample reporting on distracting instructor behaviors, the classroom distraction measure was a good fit to the data: χ^2 (2) = 1.64, CFI = 1.00, NFI = .99, RMSEA = .00. Similarly, in the sample reporting on student distracting behaviors, the measure was a good fit to the data: χ^2 (2) = 1.88, CFI = 1.00, NFI = .99, RMSEA = .00. Thus, factorial validity of the classroom distraction measure was supported. Related to scale validity, H1 predicted that distraction and cognitive load would be positively correlated. The variables were related in the instructor distractions sample, r = .37, p < .01, and in the peer distractions sample, r = .33, p = .01. H1 was confirmed.

RQ 4 asked about the extent to which each behavior distracted students using the newly developed classroom distraction scale and to what extent each behavior affected students' cognitive load. For instructor behaviors, an Analysis of Variance (ANOVA) revealed a significant model, F (3, 128) = 10.58, p < .001, ηp^2 = .20, power = .99. Although incompetence/indolence/lectures was rated as most distracting (M = 3.93, SD = 1.69) followed by offensiveness/antagonism (M = 3.80, SD = 1.48) and classroom management (M = 3.39, SD = 1.73), Scheffe post-hoc analyses indicated the distracting instructor behaviors did not significantly differ from one another on the distraction level. For cognitive load, only offensiveness/antagonism and classroom management had a negative change score indicating that the cognitive load increased as a result of the distracting behavior. Offensiveness/antagonism created the largest change in cognitive load, followed by classroom management and incompetence/indolence/lectures. However, the ANOVA revealed these differences were not significant F (3, 127) = 2.92, p = .09, ηp^2 = .02, power = .39. See Table 1.

To answer the remainder of RQ4 regarding peer behaviors, an ANOVA with the four categories of peer ACBs entered as fixed factors and perceptions of distraction entered as the dependent variable was conducted. The model was not significant, F (67) = 1.19. p = .32, ηp^2 = .05, power = .30. The ANOVA testing for possible cognitive load differences between the four ACBs was also not significant, F (67) = 1.01. p = .39, ηp^2 = .05, power = .26. In other words, each of the ACBs were equally distracting and similar in their effects on cognitive load. See Table 2.

DISCUSSION

Instructors and students co-construct the classroom environment (Galanes & Carmack, 2013) and are affected, both positively and negatively, by each other's behaviors in the classroom. Distracting behaviors, or instructor and peer behaviors that avert student attention from course content and learning objectives, have previously been explored in scholarship (e.g., teacher misbehaviors, Kearney et al., 1991; anti-citizenship behaviors, Myers et al., 2015). However, a measure that captured the degree to which a particular behavior is perceived as distracting did not exist, and thus, was previously unmeasured. Further, this study is unique in that it examined both instructor and peer behaviors identified by

Table 1. *Instructor Distracting Behaviors*

Distracting Behavior	Frequency	Example	Distraction M (SD)	Cognitive Load Change M (SD)
Incompetence / Indolence / Lecture	72	When giving a power point she tends to talk fast as well as change the slides fast. Like 2 minutes per slide with 500 words.	3.93 (1.69)	.02 (.94)
Offensiveness / Antagonism	5	When the instructor said a vulgar word	3.80 (1.48)	-1.15 (1.67)
Classroom Management	7	He played music in the background during a group project.	3.39 (1.15)	-.10 (.40)

Table 2. *Peer Distracting Behaviors (ACBs)*

Distracting Behavior	Frequency	Example	Distraction M (SD)	Cognitive Load Change M (SD)
Participation	22	Sometimes students will ask questions that seem to be completely unrelated to the class material presented in class that day.	5.18 (1.09)	-.09 (.75)
Technology	2	music in head phones was too loud and everyone around him could hear it	5.04 (1.09)	-.28 (.69)
Physical	2	when a student shows up late and walks in during the middle of class and when the instructor is talking.	5.80 (.84)	.25 (.70)
Etiquette	7	They were talking loudly next to me.	5.18 (1.01)	-.25 (.94)
None	14		--	--

students as distracting. Finally, departing from previous studies, this study used a cognitive load theoretical perspective to add to our understanding of potential explanatory mechanisms for how these behaviors detract from student learning.

Generally, students were easily able to recall specific days, events, and people who they found distracting. The ease with which they could recall these instances speaks to the level of distraction that occurred – it was memorable for students even when students may not always recall important course content. That is, these distracting behaviors may impede on cognitive load and cause students to shift their cognitive processing resources to managing a distraction rather than processing course content, directions, assignments, and feedback. As expected, many of the instructor distractions aligned with existing categories of teacher misbehaviors. Teacher misbehaviors, by definition, detract from student learning (Kearney et al., 1991). This study provides some insight into a potential explanation for decreased learning in the presence of instructor misbehaviors. Students reported these behaviors distract from course content and, in many cases, negatively influenced their perceived information processing abilities. However, measuring levels of distraction associated with these behaviors was not possible prior to the scale developed in this study.

Although the prompt for soliciting student perceived misbehaviors in the seminal research included "instances where teachers had said or done something that had irritated, demotivated, or substantially distracted" students (Kearney et al., 1991, p. 313), scholars were unable to differentiate between distracting behaviors and conceptually different appraisals such as demotivating or irritating. Further, without the focused inquiry into distracting behaviors, scholars and instructors may be unaware of student perceptions of certain behaviors or the effects of those behaviors. In this study, instructor misbehaviors all appeared to be distracting, but were equally distracting.

Some things that students reported as distracting have been identified as positive teaching behaviors in other research. For example, instructor humor was identified as distracting. Previous research has explained that appropriate humor can increase affect and immediacy (Gorham & Christophel, 1990; Wrench & Richmond, 2004) and make content memorable and aid in learning (Goodboy, Booth-Butterfield, Bolkan, & Griffin, 2015; Myers, Goodboy, & Members of COMM 600, 2014; Wanzer & Frymier, 1999), thereby improving instructor-student relationships and the classroom experience. In another example, students reported instructor behaviors that disrupted their thinking as distracting, and the exemplar provided described an instructor playing music during an in class group project. Because playing music during group work may also be a relational tool (e.g., playing students' favorite songs) or a classroom management tool (i.e., signaling when students should work in groups and when students should turn their attention to the instructor), students may not consider this behavior to be an instructor misbehavior, yet it was still perceived as distracting. This nuance suggests that distractions can occur in response to both positive and negative instructor behaviors. A potential explanation for this is that these behaviors may be arousing, or alleviate boredom, allowing students to re-focus their attention on the present moment in the classroom (Rosegard & Wilson, 2013).

All of the student distracting behaviors were able to be categorized as ACBs. Thus, a primary conclusion is that distracting others from learning equates to poor classroom citizenship. While the behaviors were easily categorized as ACBs, some of the behaviors did not align with student distracting behaviors identified by instructors (Johnson et al., 2017). For example, student behaviors such as tapping fingers on a desk were not reported by instructors in previous research, but were reported by students in our study. This discrepancy likely results from instructors viewing student behaviors differently than students. The fact remains that peer behaviors do impede students from maintaining complete focus on course content, instructor, or tasks.

Descriptively, students perceived that they experienced differences in cognitive load most when instructors displayed offensiveness/antagonism, followed by classroom management, and then incompetence/indolence/lecture. However, all of the instructor behaviors had equally negative effects on cognitive load. We reason then, that students' perceptions of these distracting behaviors prevent them from engaging in schema construction and deep processing of information, which then detracts from learning.

The findings of this study also highlight the ability for peer ACBs to detract from learning. Although cognitive load theory positions the instructor as being in control of his or her own behaviors and instruction to avoid negative load (Sweller, 1988), arguably, instructors should also be in control of students as a source of extraneous load. That is, because classroom management and maintaining student focus on learning is the instructor's responsibility (Kearney et al., 1991), instructors are tasked with policing their own and students' distracting behaviors to ensure an engaged classroom environment. Hence, excessive or repetitive student distractions may indicate that an instructor is a poor classroom manager. Yet, this presents a conundrum, as instructors' classroom management techniques to address student ACBs may also distract students, as classroom management emerged as a distraction category in our study.

The development and testing of the classroom distraction scale provides a valuable tool for future research. Although scholars have identified student classroom behavior expectations (e.g., Boice, 1996) and instructor misbehaviors that may distract from learning (Goodboy & Myers, 2015; Kearney et al., 1991), scholars had yet to measure the degree to which these behaviors distract instructors and students in the classroom. The 4-item scale provided here is stable, valid, and reliable and has been tested with primary classroom stakeholders: students and instructors as both receivers and senders of distracting behaviors. The brief scale allows distraction to be measured in a variety of classroom contexts and samples. The brevity of the scale can benefit both scholars and practitioners.

Theoretically, our results align with the fundamental assumptions of CLT. Specifically, students reported instructor distracting behaviors represent extraneous factors that are in direct control of the instructor. Consistent with previous research, some instructor misbehaviors (Goodboy & Myers, 2015) negatively affected students' reported cognitive load. Sweller (1988) posited that poor instruction leads to an increase in students' experienced negative load and reduces their mental capacity to construct schema and deeply process information. Therefore, as students perceived instructors to rush through content, not intentionally focus on students' reception and understanding of the content, and interrupt students' thinking, students experi-

enced an increase in negative cognitive load while, at the same time, perceiving the instructor to be distracting.

Previous cognitive load research focuses primarily on instructors as sources of extraneous load. However, in the current study, students reported experiencing cognitive load as a result of peer distractions. Specifically, students' ACBs (e.g., technology use, speaking off topic, and engaging in side conversations) during class negatively affected peers' cognitive load. Therefore, peer behaviors negatively influence students' ability to engage in mental processing of the content being presented in the course; as perceptions of peer distractions increased, students' negative cognitive load also increased. With little explanation of this relationship in extant research, it is assumed based on the basic premises of the theory that extraneous cognitive load isn't limited to poor instruction, but can also be impacted by distracting peer behaviors, as evidenced in this study. The results hold several practical implications for teachers and researchers.

Practical Implications

Practically, these results support the need for several classroom management techniques and policies to be implemented in the classroom to help decrease student distracting behaviors. Specifically, instructors should focus primarily on students' participatory behaviors. Beyond encouraging participatory behaviors such as volunteering in class discussions and asking questions (Rocca, 2010), instructors should also implement and maintain parameters for managing distracting participatory behaviors. This may include limiting student side conversations (i.e., etiquette) and implementing more active learning and clear behavioral expectations (as summarized in Boice, 1996). Further, instructors may address distracting technology use by strategically engaging students with on task learning behaviors using the technology (Burns & Lohenry, 2010; Campbell, 2006; Frisby, 2017) and consistently enforcing the technology-in-the-classroom policies (Finn & Ledbetter, 2014; Ledbetter & Finn, 2013). In fact, Quian and Li (2017) found that students were more easily distracted by technology when overwhelmed by information, the class was too easy, or the instructor was not involved or relating to students. Perhaps information overload or easiness of the course aligns with intrinsic load (e.g., too much information) or extraneous load (e.g., the instructor presents it in a confusing way).

From an instructor training perspective, basic teaching and lecture skills seem to be the most frequently occurring distracting behavior that should be addressed. The specific behaviors that appear to be the most important areas are going off topic (i.e., relevance) and ineffective presentations. Extant research highlights the importance of instructor relevance in general (Frymier & Shulman, 1995) and in maintaining that relevance when self-disclosing (Schrodt, 2013) or using humor (Sidelinger, 2014). Specifically, relating content to students' current lives and interests are ways in which instructors can avoid going off topic (Muddiman & Frymier, 2009). Tips for effective presentations include avoiding PowerPoint overload and reducing presentation pace, for example (Yilmazel-Sahim, 2009). Although not frequently occurring, poor classroom management is another area where training can be critical. Classroom management requires skills training and efficacy-building feedback (Tschannen-Moran, Hoy, & Hoy, 1998). Efficacy in classroom management helps teachers to plan effective strategies to approach classroom issues (Dibapile, 2012). However, managing student behaviors which instructors may not be aware are distracting for other students is difficult. Instructors may allow students to provide anonymous mid-semester feedback about the presence of distractions in the classroom to target classroom management interventions.

Finally, this study suggests that instructors may focus policies and training on behaviors that have no real detrimental outcomes for attention and cognitive processing. If behaviors such as students using technology are not supported as significantly more distracting or negatively influencing cognitive load than other ACBs, then these behaviors should not be a primary focus of policies, classroom management, or instructor training, regardless of how frequently they may occur. However, future research on these behaviors may find negative outcomes that were not examined in this study (e.g., affect, learning, classroom climate), which would necessitate a renewal of research attention on these behaviors.

Limitations and Future Directions

This study provides valuable insight into student perceptions of peer and instructor distractions, but should also be interpreted in light of inherent study limitations. First, although the sample size provided adequate power to detect differences, there was inadequate power to test how each specific behavior may have impeded cognitive load for both populations and distraction for student ACBs. Related to the sample, this sample was mostly first year students because they often take this required course within the first year of their university curriculum. Senior students may experience different levels, and sources, of distraction. Replicating this study with a larger and more diverse sample may provide additional insight into possible differences in distractibility across different cohorts. Second, although cognitive load is an important consideration due to its connection to student learning, measuring active cognitive acquisition would have supported further claims about the detrimental effect of distracting behaviors on students. As an exploratory study, though, the results provide the groundwork to focus and facilitate future research on specific behaviors and their effects on learning outcomes, including a theoretical and potentially explanatory mechanism: cognitive load. While the cognitive load change score provided a valid measurement for the influence of distractions on students' experienced cognitive load, the scale we used did not account for all three dimensions of cognitive load (i.e., intrinsic, extraneous, and germane). Future research should account for the influence of instructor and peer distractions on all three dimensions of cognitive load. Finally, we did not assess student characteristics that may affect the ease with which they may be distracted (e.g., attention disorders, personality, motivation). Measuring and controlling for these specific student characteristics using existing, validated scales (e.g., situational motivation, Guay, Vallerand, & Blanchard, 2000; learning orientation scale, Milton Pollio, & Eisen, 1986) or diagnostic tools (e.g., ADHD behavior checklist, Barkley, 1997) would allow for researchers to examine the nuances of distractibility that are actually attributable to others' behaviors. Although previous research has found that instructor demographics (e.g., race) and characteristics (e.g., accent) have emerged as misbehaviors or distracting for students, these components of instructor identity did not emerge in our data. However, future research may examine how instructor identity may influence students' threshold of tolerance and forgiveness of misbehaviors and distractions.

Future studies may investigate specific sources of student distraction and assist instructors in grounding classroom policies in empirical research to improve the overall learning environment (e.g., no cell phones, don't arrive to class late). Additionally, scholars may more precisely investigate the role of distraction in the classroom, such as connections between distraction and student learning, as well as possible differences between self-distraction (e.g., playing on Facebook) and other-distraction (e.g., a peer's irrelevant disclosure) during class. Given the broad, and easily adaptable nature of the new scale, this instrument can also be used in future research exploring instructors' distracting behaviors and how they may influence student engagement and learning. Therefore, the distraction measure presented in this study provides a flexible and heuristic instrument for future research. By understanding the role of distraction in the classroom, instructors can more skillfully manage classroom experiences and develop strategies to circumvent adverse effects of distraction.

REFERENCES

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin, 121*, 65–94.

Boice, B. (1996). Classroom incivilities. *Research in Higher Education*, *37*, 453-86.

Bolkan, S. (2015). The importance of instructor clarity and its effect on student learning: Facilitating elaboration by reducing cognitive load. *Communication Reports*. Advance online publication. doi:10.1080/08934215.2015.1067708

Bolkan, S., Goodboy, A. K., & Kelsey, D. M. (2016). Instructor clarity and student motivation: Academic performance as a product of students' ability and motivation to process instructional material. *Communication Education*, 65, 129-148. doi:10.1080/03634523.2015.1079329

Burns, S. M., & Lohenry, K. (2010). Cellular phone use in class: Implications for teaching and learning a pilot study. *College Student Journal*, *44*, 805-810.

Campbell, S. (2006). Perceptions of mobile phones in college classrooms: Ringing, cheating, and classroom policies. *Communication Education, 55*, 280-294.

Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, *8*, 293-332. doi:10.1207/s1532690xci0804_2

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Cronbach, L. J., & Meehl, P. E. (1995). Construct validity in psychological tests. *Psychological Bulletin, 52*, 281-302. doi. 10.1037/h0040957

Dibapile, W. S. (2012). A review of literature on teacher efficacy and classroom management. *Journal of College Teaching & Learning*, *9*(2), 79-92.

Elder, A. (2013). College students cell phone use, beliefs, and effects on their learning. *College Student Journal, 47*, 585-592.

Finn, A. N., & Ledbetter, A. M. (2014). Teacher verbal aggressiveness and credibility mediate the relationship between teacher technology policies and perceived student learning. *Communication Education, 63,* 210-234. doi:10.1080/03634523.2014.919009

Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers and Education, 50,* 906-914.

Frisby, B. N. (2017). Capitalizing on the Inevitable: Adapting to Mobile Technology in the Basic Communication Course. *Basic Course Annual, 29,* 75-82.

Frymier, A. B., & Shulman, G. M. (1995). `What's in it for me?': Increasing content relevance to enhance students' motivation. *Communication Education*, *44*(1), 40-50.

Galanes, G. J., & Carmack, H. J. (2013). "He's really setting an example": Student contributions to the learning environment. *Communication Studies, 64,* 49-65. doi:10.1080/10510974.2012.731464

Gefen, D., & Straub, D. (2005). A practical guide to factorial validity using PLS-graph: Tutorial and practical example. *Communications of the Association for Information Systems, 16,* 91-109.

Goodboy, A. K., Booth-Butterfield, M., Bolkan, S., & Griffin, D. J. (2015). The role of instructor humor and students' educational orientations in student learning, extra effort, participation, and out-of-class communication. *Communication Quarterly, 63,* 44-61. doi: 10.1080/01463373.2014.965840

Goodboy, A. K., & Myers, S. A. (2015). Revisiting instructor misbehaviors: A revised typology and development of a measure. *Communication Education, 64,* 133-153. doi:10.1080/03634523.2014.978798

Gorham, J., & Christophel, D. M. (1990). The relationship of teachers' use of humor in the classroom to immediacy and student learning. *Communication Education, 39,* 46-62.

Guay, F., Vallerand, R. J., & Blanchard, C. (2000). On the assessment of situational intrinsic and extrinsic motivation: The Situational Motivation Scale (SIMS). Motivation and emotion, 24, 175-213.

Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures, 1*, 77-89.

Hirschy, J. R., & Braxton, J. M. (2004). Effects of student classroom incivilities. *New Directions for Teaching and Learning*, *99*, 67-76. doi:10.1002/tl.160

Johnson, D. I. (2013). Students in-class texting behavior: Associations with instructor clarity and classroom relationships. *Communication Research Reports, 30,* 57-62. doi:10.1080/08824096.2012.723645

Johnson, Z. D., Claus, C. J., Goldman, Z. W., & Sollitto, M. (2017). College student misbehaviors: An exploration of instructor perceptions. *Communication Education, 66*, 54-69. doi:10.1080/03634523.2016.1202995

Jong, T. (2010). Cognitive load theory, educational research, and instructional design: Some food for thought. *Instructional Science*, *38*, 105-134. doi:10.1007/s11251-009-9110-0

Kane, R. G. (2010). Teaching as counterinsurgency: Enhancing pedagogical effectiveness and student learning in a culture of distraction. *The History Teacher, 43*, 375-396.

Kearney, P., Plax, T. G., Hays, E. R., & Ivey, M. J. (1991). College teacher misbehaviors: What students don't like about what teachers say and do. *Communication Quarterly*, *39*(4), 309-324. doi:10.1080/01463379109369808

Kearney, P., Plax, T. G., Sorensen, G., & Smith, V. R. (1988). Experienced and prospective teachers' selections of compliance-gaining messages for "common" student misbehaviors. *Communication Education*, *37*, 150-164. doi:10.1080/03634528809378712

Kuznekoff, J. H, Munz, S., & Titsworth, S. (2015). Mobile phones in the classroom: Examining the effects of texting, twitter, and

message content on student learning. *Communication Education, online*, 1-22. doi:10.1080/03634523.2015.1038727

Kuznekoff, J. H., & Titsworth, S. (2013). The impact of mobile phone usage on student learning. *Communication Education*, *62*(3), 233-252. doi:10.1080/03634523.2013.767917

Ledbetter, A. M., & Finn, A. N. (2013). Teacher technology policies and online communication apprehension as predictors of learner empowerment. *Communication Education, 62,* 301-317. doi:10.1080/0003634523.2013.794386

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist*, *38*, 43-52. doi:10.1207/S15326985EP3801_6

Mayer, R. E., & Moreno, R. (2010). Techniques that reduce extraneous cognitive load and manage intrinsic cognitive load during multimedia learning. In J. L. Plass, R. Moreno, & R. Brunken, (Eds.), *Cognitive Load Theory* (pp. 131-152). New York, NY: Cambridge University Press.

McCoy, B. R. (2013). Digital distractions in the classroom: Student classroom use of digital devices for non-class related purposes. *Journal of Media Education*, *4*, 5-14.

McCroskey, J. C., & Richmond, V. P. (1993). Identifying compulsive communicators: The talkaholic scale. *Communication Research Reports*, *10*, 107-114. doi:10.1080/08824099309359924

McPherson, M. B., & Liang, Y. (2007). Students' reactions to teachers' management of compulsive communicators. *Communication Education, 56,* 18-33. doi:10.1080/03634520601016178

Milton, O., Pollio, H. R., & Eisen, J. A. (1986). *Making sense of college grades*. San Francisco, CA: Jossey-Bass.

Muddiman, A., & Frymier, A. B. (2009). What is relevant? Student perceptions of relevance strategies in college classrooms. *Communication Studies*, *60*, 130-146. doi:10.1080/10510970902834866

Myers, S. A., Goldman, Z. W., Ball, H., Carton, S. T., Atkinson, J., Tindage, M. F., & Anderson, A. O. (2015). Assessing college student use of anti-citizenship classroom behavior: Types, reasons, and association with learning outcomes. *Communication Teacher*, *29*(4), 234-251. doi:10.1080/17404622.2015.1064984

Myers, S. A., Goodboy, A. K., & Members of COMM 600. (2014). College student learning, motivation, and satisfaction as a function of effective instructor communication behaviors. *Southern Communication Journal, 79,* 14-26. doi:10.1080/1041794X.2013. 815266

O'Donnell, A. (2015). Contemplative pedagogy and mindfulness: Developing creative attention in an age of distraction. *Journal of Philosophy of Education, 49,* 187-202. doi:10.1111/1467-9752.12136

Pass, F. G., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist*, *38*, 1-4. doi:10.1027/s15326985EP3801_1

Paas, F. G., Tuovinen, J. E., Tabbers, H., & van Gerven, P. (2003). Cognitive load measurement as a means to advance cognitive load theory. *Educational Psychology*. *38*, 63-71. doi:10.1027/S153269985EP3801_8

Plax, T. G., Kearney, P., McCroskey, J. C., & Richmond, V. P. (1986). Power in the classroom VI: Verbal control strategies, nonverbal immediacy, and affective learning. *Communication Education, 35,* 43-55. doi:10.1080/0363452860938831 8

Qian, Y., & Li, L. (2017). Student Off-Task Electronic Multitasking Predictors: Scale Development and Validation. *Journal Of The Scholarship Of Teaching And Learning*, *17*, 53-73.

Rocca, K. A. (2010). Student participation in the college classroom: An extended multidisciplinary literature review. *Communication Education, 59,* 185-213. doi:10.1080/03634520903505936

Rosegard, E., & Wilson, J. (2013). Capturing Students' Attention: An Empirical Study. *Journal Of The Scholarship Of Teaching And Learning*, *13*, 1-20.

Sana, F., Weston, T., & Cepeda, N. J. (2013). Laptop multitasking hinders classroom learning for both users and nearby peers. *Computers & Education*, *62*, 24-31. doi:10.1016/j.compedu.2012.10.003

Schrodt, P. (2013). Content relevance and students' comfort with disclosure as moderators of instructor disclosures and credibility in the college classroom. *Communication Education*, *62*(4), 352-375.

Seidman, A. (2005). The learning killer: Disruptive student behavior in the classroom. *Reading Improvement, 42,* 40-46.

Sexton, B. T. (2017). *Exploring the influence of students' perceptions of instructional message content relevance and experienced cognitive load on students' cognitive learning* (unpublished doctoral dissertation). University of Kentucky, Lexington, KY.

Shadiev, R., Hwang, W., Huang, Y., & Liu, T. (2015). The impact of supported and annotated mobile learning on achievement and cognitive load. *Journal of Educational Technology & Society*, *18*(4), 53-69.

Sidelinger, R. J. (2014). Using relevant humor to moderate inappropriate conversations: maintaining student communication satisfaction in the classroom. *Communication Research Reports*, *31*(3), 292-301. doi:10.1080/08824096.2014.924339

Sidelinger, R. J., & Booth-Butterfield, M. (2010). Co-constructing student involvement: An examination of teacher confirmation and student-to-student connectedness in the college classroom. *Communication Education*, *59*(2), 165-184. doi:10.1080/03634520903390867

Sidelinger, R. J., Nyeste, M. C., Madlock, P. E., Pollak, J., & Wilkinson, J. (2015). Instructor privacy management in the classroom: Exploring instructors' ineffective communication and student communication satisfaction. *Communication Studies*, *66*(5), 569-589. doi:10.1080/10510974.2015.1034875

Simonds, C. J. (1997). Challenge behavior in the college classroom. *Communication Research Reports, 14,* 481-492.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, *12*, 257-285. doi:10.1207/s15516709cog1202_4

Sweller, J., van Merrienboer, J. J. G., & Paas, F. G. W. C. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, *10*, 251-296. doi:10.1023/A:1022193728205

Tschannen-Moran, M., Hoy, A., & Hoy, W. K. (1998). Teacher efficacy: Its meaning and measure. *Review of Educational Research, 68*, 202–248.

van Merrienboer, J. J., & Sweller (2005). Cognitive load theory and complex learning: Recent developments and future directions. *Educational Psychology Review*, *17*, 147-177. doi:10.1007/s10648-005-3951-0

Wanzer, M. B., & Frymier, A. B. (1999). The relationship between student perceptions of instructor humor and students' reports of learning. *Communication Education, 48,* 48-62.

Wrench, J. S., & Richmond, V. P. (2004). Understanding the psychometric properties of the humor assessment instrument through an analysis of the relationships between teacher hu-

mor assessment and instructional communication variables in the college classroom. *Communication Research Reports, 21,* 92-103.

Yilmazel-Sahin, Y. (2009). A comparison of graduate and undergraduate teacher education students' perceptions of their instructors' use of "Microsoft Powerpoint". *Technology, Pedagogy and Education*, *18*(3), 361-380.

Zhang, S., Shi, Q., Tonelson, S., & Robinson, J. (2009). Preservice and inservice teachers' perceptions of appropriateness of teacher self-disclosure. *Teaching & Teacher Education*, *25*(8), 1117-1124. doi:10.1016/j.tate.2008.07.011