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The effects of relevant instructor self-disclosure on student affect and cognitive learning: A live lecture experiment

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ABSTRACT

The purpose of this teaching experiment was to examine the causal effect of relevant (compared to irrelevant) instructor self-disclosure on student affect and cognitive learning. Undergraduate students ($N = 288$) were randomly assigned to a 19-minute classroom lecture with an instructor who taught the same lesson but self-disclosed either relevant or irrelevant information while teaching. Results indicated that relevant instructor self-disclosure increased student affect in students' likelihood to enroll with the instructor again but did not influence students' general affect toward the instructor. Findings also revealed a direct effect of self-disclosure relevance on students' test scores; on average, students scored 8.42% higher on a short-term recall test compared to students in the irrelevant self-disclosure condition, controlling for lesson coherence. Practical implications are provided for how instructors might use relevant self-disclosures in their teaching.

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relevance; affect; clarity;
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During a classroom lecture, instructors have the opportunity to share personal information with their students and often choose to reveal personal information about their family, friends, educational background, and favorite hobbies (Downs et al., 1988). Under the assumption that self-disclosure may be beneficial to students, instructors choose to self-disclose to spark attention, kindle classroom discussion, and provide personal examples of lesson content (McBride & Wahl, 2005). Nussbaum (1992) suggested that instructor self-disclosure is an effective teaching strategy because it has the potential to clarify course material and enhance positive student outcomes such as student affect and cognitive learning. Instructor self-disclosure is a multidimensional construct that varies in amount, depth, intent, honesty, breadth, topic, timing, appropriateness, valence, and relevance (Cayanus & Martin, 2008; Cayanus & Martin, 2016; Sorensen, 1989; Wheelless & Grotz, 1976).

There is evidence that the self-disclosure dimension of relevance has the potential to enhance both student affect and cognitive learning (Cayanus & Heisler, 2013; Cayanus & Martin, 2008; Goodboy et al., 2014). Self-disclosure relevance is the extent to which an instructor's personal disclosures relate to the lesson content (Cayanus & Martin, 2008). Researchers have identified that self-disclosure relevance is correlated positively

with student affect toward the instructor and course overall (Cayanus & Heisler, 2013; Cayanus & Martin, 2008; Goodboy et al., 2014) as well as perceived learning (Cayanus & Martin, 2008; Goodboy et al., 2014). Thus far, survey studies examining the relevance dimension have provided correlational evidence that instructor self-disclosure may have the potential to foster student learning, but this correlational evidence relies on students' perceptions of their own learning rather than more traditional assessments of learning such as a short-term recall test. Moreover, the handful of studies that have used an experimental design to examine instructor self-disclosure have produced mixed results regarding its effect on student learning. Some experiments have found that instructor self-disclosure increases cognitive learning (McCarthy & Schmeck, 1982; Stoltz et al., 2014), decreases cognitive learning (Naumann, 1988), or has no effect at all on learning (Aubry, 2009; Ivy, 2016). The mixed findings may be due to researchers designing the experiments to examine self-disclosure versus no self-disclosure rather than specific self-disclosure dimensions tied to learning. Since instructor self-disclosure relevance is correlated with perceived cognitive learning (e.g., Goodboy et al., 2014), it is important to examine this specific dimension more closely to determine its effects on authentic student learning. Therefore, the next step would be to conduct an experiment that manipulates instructor self-disclosure relevance in a real classroom to determine if this dimension actually causes students to perform better (or worse) on a test of cognitive learning.

The purpose of this study was twofold. First, in a live teaching experiment, we examined the causal effects of relevant instructor self-disclosure on students' affect. Second, we tested a mediation model to determine how instructor self-disclosure relevance might enhance lesson coherence, and in turn, foster student cognitive learning indirectly and/or directly.

Literature review

Rhetorical and relational goals theory

Self-disclosure is an effective teaching behavior that may be able to fulfill instructor communication goals in the classroom. Mottet and his colleagues (2006) conceptualized rhetorical/relational goal theory (RRGT) that posits instructors have both rhetorical and relational goals in the classroom. When seeking to meet rhetorical goals, instructors “focus on influencing students to learn and understand the content presented by the teacher” (Mottet et al., 2006, p. 267). When striving to meet relational goals, instructors are “seeking a closer relationship with students” and “view learning as something the teacher and students do together” (Mottet et al., 2006, p. 267). Mottet and colleagues suggested that instructors should meet both goals in order to fulfill students' classroom expectations and facilitate effective instruction.

Using RRGT as a theoretical framework, Kaufmann and Frisby (2017) asserted that instructor self-disclosure was an effective teaching behavior because it could simultaneously meet instructors' rhetorical goals (i.e., influence students to learn the content) and relational goals (i.e., seek a healthy interpersonal relationship with students). Moreover, Cayanus and Martin (2016) suggested that instructor self-disclosure is “one communication strategy that teachers may use to attain these goals” (p. 244).

In Kaufmann and Frisby's (2017) survey study, the researchers found that personal self-disclosure helped achieve instructors' rhetorical goals by promoting content relevance and relational goals by fostering student perceptions of caring, connectedness, and liking. Using RRGTT as a framework for this experimental study may help provide a deeper understanding of how instructor self-disclosure positively influences student affect and cognitive learning.

However, researchers have found both benefits and drawbacks related to the use of instructor self-disclosure in the classroom. Some benefits include that instructor self-disclosure helps clarify course material (Downs et al., 1988) and makes the instructor more likeable (Sorensen, 1989). Conversely, Kearney and colleagues (1991) found that some students perceive instructors as misbehaving when they disclose too much personal information and stray from the class subject. Given the evidence of both benefits and drawbacks, the effectiveness of instructor self-disclosure may ultimately depend on whether instructors' self-disclosures are relevant to students' learning.

Self-disclosure relevance

Cayanus and Heisler (2013) recommended that instructor self-disclosure should be pertinent to the learning content. When it comes to instructor self-disclosure, relevance is defined as "how the disclosure relates to class material" (Cayanus & Martin, 2016, p. 251). Cayanus and Martin's (2008) self-disclosure relevance dimension was built upon content relevance research. Frymier and Shulman (1995) defined content relevance as the perception that classroom content satisfies students' personal needs, interests, and goals. Instructors sometimes share personal examples from their lives to enhance lesson content relevance (Muddiman & Frymier, 2009), which may ultimately increase students' motivation to learn the lesson material (Frymier & Shulman, 1995). Self-disclosure relevance is argued to be "the most significant dimension which has to be considered before disclosing to the classroom" (Paluckaite & Zardeckaite-Matulaitiene, 2015, p. 21). This may be why instructors who clearly relate the relevance of their self-disclosures to the course material are more likely to be perceived as effective teachers (Andersen et al., 1981). Overall, relevance is an important dimension of instructor self-disclosure that merits further research because relevant instructor self-disclosure may have the potential to create student affect and foster student learning (Cayanus & Martin, 2016).

Rationale

Self-disclosure relevance and student affect

Students report that they like when their instructors use self-disclosure because it allows them to get to know the instructor on a more personal level (Gregory, 2005). The use of relevant instructor self-disclosure might create more student *affect* compared to irrelevant instructor self-disclosure. Instructional communication scholars have conceptualized "affect" as positive attitudes that students perceive toward the instructor, course content, and/or the behaviors recommended in the course (Andersen, 1979). Instructors feel that sharing disclosures allows them to personally connect to their students (Katadae, 2005). Students report high levels of affect toward the instructor and the course in general

when instructors offer these personal disclosures from their lives (Gregory, 2005). From the perspectives of both instructors and students, instructor self-disclosure is an important relational communication behavior.

According to RRG, instructors should strive to maintain student affect because it may help them achieve their relational goals and meet students' classroom expectations (Mottet et al., 2006). Kaufmann and Frisby (2017) suggested that instructors "should employ relevant disclosures that are personally related to the course content and relevant to students" to achieve their relational goals (p. 227). Instructors may be able to use relevant self-disclosure to enhance student affect.

Relevant instructor self-disclosure has the potential to foster student affect (Cayanus & Martin, 2016; Kaufmann & Frisby, 2017). Cayanus and Martin (2008) found that relevant self-disclosure is associated positively with increased affect toward the instructor. Other researchers have found that students liked the instructor more when instructor self-disclosure was relevant to the lesson (Cayanus & Heisler, 2013). Furthermore, Goodboy and colleagues (2014) found that students reported increased affect toward the instructor, the course, and the behaviors recommended in the course when instructors used relevant self-disclosure.

Conversely, students may report lower levels of affect toward instructors who use irrelevant self-disclosure. When instructors use irrelevant self-disclosure, students report less affect toward the course, the instructor, and the likelihood of taking another course with the same instructor (Orbash, 2008). Students perceive their instructors as misbehaving when they share personal disclosures that are irrelevant and stray from the lesson topic (Goodboy & Myers, 2015; Kearney et al., 1991). Moreover, instructors avoid personal disclosures that stray from the lesson topic because they feel it may lead students to express reduced liking and increased frustration (McBride & Wahl, 2005). Thus, both students and instructors believe that instructor self-disclosure should be relevant to the lesson content to avoid reduced feelings of affect toward the instructor.

Overall, instructor self-disclosure is a relational behavior with the potential to build student affect if it is relevant to the lesson content. Previous research suggests that using relevant instructor self-disclosure is associated with increased student affect toward the instructor and the likelihood of enrolling in a course with the same instructor in the future (Cayanus & Heisler, 2013; Cayanus & Martin, 2008; Goodboy et al., 2014). However, this positive relationship has been based on correlational survey research and has not been tested in a live lecture teaching experiment as a causal effect. Therefore, the first hypothesis is offered:

H1: Compared to a lesson with irrelevant instructor self-disclosure, relevant instructor self-disclosure will create more student (a) affect toward the instructor and (b) affect to enroll with the same instructor in a future course.

Self-disclosure relevance and student cognitive learning

Instructor self-disclosure may also be a rhetorical behavior because it has the potential to clarify lesson content, and in turn, increase student learning. Clarity is defined as "students' perceptions of teachers' communication-related behaviors that assist in selecting, understanding, and remembering information" (Titsworth & Mazer, 2016, p. 105). Students report higher levels of instructor clarity when instructors use relevant self-

disclosure while teaching (Cayanus & Martin, 2008). However, the specific reason why relevant instructor disclosure is related to students' perceptions of clarity is unclear. Instructor self-disclosure may be related to specific aspects of instructor clarity. When developing the Clarity Indicators Scale, Bolkan (2017) identified five dimensions of instructor clarity: coherence, interaction, structure, disfluency, and working memory overload. Specifically, coherence involves the extent to which instructors avoid providing superfluous information that is not essential to learning lesson content. In other words, instructors that stay on topic with their lectures are perceived as coherent and, therefore, clear (Bolkan, 2017). When instructors self-disclose, they are providing supplemental personal information that may be deemed essential or inessential to the lesson depending on whether students perceive this information as relevant for their learning.

Students may perceive relevant instructor self-disclosure as necessary to learning the lesson content because it provides conditional knowledge. Conditional knowledge is information that instructors provide to help students understand when and where new declarative knowledge (e.g., facts, terminologies, tactics) would be applicable in certain contexts (Alexander et al., 1991). For example, a business instructor may teach negotiation strategies such as dominating, integrating, and obliging (declarative knowledge). Then, the instructor may provide personal self-disclosures—from when they were a car salesperson—describing when to use each negotiation strategy depending on a customer's negotiation abilities (conditional knowledge). When instructors regularly describe their own personal experiences in relation to class content, students report that this practice highlights concepts and promotes understanding of the material within a particular context (Downs et al., 1988). This enhanced understanding may occur because relevant instructor self-disclosure conveys the conditional knowledge of the lesson content. The conditional knowledge in the instructor's personal disclosures has the potential to make the content more relevant to student's lives, and in doing so, helps meet the instructor's rhetorical goals of reinforcing and clarifying lesson content (Kaufmann & Frisby, 2017; Mottet et al., 2006). Moreover, Keller (1987) asserts that instructors can use short content-related anecdotes to gain student attention and provide practical examples of lesson content. Relevant instructor self-disclosure may enhance learning because it directs students' attention toward the most important lesson concepts, thus clarifying lecture material. When instructors provide a relevant self-disclosure that sparks attention and helps students understand when, where, and why to use new declarative knowledge, students may perceive this supplemental information as essential to learning course concepts, which in turn, enhances lesson coherence.

Irrelevant instructor self-disclosure should have the opposite effect on lesson coherence. Students perceive a lecture as incoherent when an instructor “goes on unrelated tangents” during their lectures (Bolkan, 2017, p. 28). Students may perceive instructors as going on a tangent when they use irrelevant personal disclosures that do not relate back to the material. In doing so, it may make the overall lesson less clear. When instructors share information that is perceived as unnecessary to learning the lesson material, they may reduce student perceptions of clarity because this superfluous information directs students' attention to unimportant aspects of the lesson content (Land, 1979). Researchers have also found that students experience more receiver apprehension when instructors share irrelevant self-disclosure (Goodboy et al., 2014). The lack of relevant information in personal disclosures might lead students to feel anxious about not

clearly understanding important concepts in the lecture, which may impede students' ability to learn the course content.

After describing the relationship between relevant instructor self-disclosure and lesson coherence, the next step is to examine the relationship between lesson coherence and student cognitive learning. Bloom (1956) defined cognitive learning as "the recall or recognition of knowledge and the development of intellectual abilities and skills" (p. 7). Titsworth and colleagues (2015) conducted two meta-analyses that investigated the relationship between instructor clarity and cognitive learning. In meta-analysis two, the researchers provided clear evidence for a moderate positive relationship ($r = .42$) between instructor clarity and performed cognitive learning (e.g., tests of retention). In other words, students taught by a clear instructor tended to score higher on a cognitive learning test. Because lesson coherence is an integral dimension of clarity (Bolkan, 2017), it is expected that coherence will be related positively to students' test performance.

Instructors who use self-disclosure that is relevant to the lesson should increase lesson coherence and ultimately increase students' performance on a cognitive learning test. Conversely, irrelevant instructor self-disclosure should make it more difficult for students to follow along with a lecture, reduce perceptions of lesson coherence, and in turn, hinder students' performance on a cognitive learning test. Thus, the second hypothesis is offered as test of mediation:

H2: Students will score higher on a test of the material when they attend a lesson with an instructor who uses relevant self-disclosure (compared to an instructor who uses irrelevant self-disclosure) because of increased lesson coherence.

Method

Pilot study

After receiving IRB approval, the researchers conducted a pilot test to assess the relevant and irrelevant instructor self-disclosures that would be used in the live lecture teaching experiment (i.e., primary study). Instructor self-disclosures that vary in general lesson relevance (i.e., relevant/irrelevant) were developed using previous instructor self-disclosure research as a guide (Cayanus & Martin, 2008; Downs et al., 1988). The development of the self-disclosures resulted in two instructor self-disclosure conditions: relevant self-disclosure and irrelevant self-disclosure. A 19-minute lesson script and PowerPoint presentation were also developed for the two conditions. The lesson topic was affectionate communication (Floyd, 2006). On average, instructors share 10 self-disclosures per 50-minute classroom lecture (Downs et al., 1988). Within the current study's lesson scripts, the instructor shared 11 personal self-disclosures during the 19-minute lesson to make sure that the manipulations were detectable to students. The quantity, length, and general topics of the instructor self-disclosures were the same for both conditions. The lesson content that was taught and PowerPoint slides remained exactly the same between the two conditions. The only difference between teaching conditions was the manipulation of relevant/irrelevant instructor self-disclosures throughout the lectures.

The researchers visited communication studies courses to pilot test the relevance and perceived realism of the instructor self-disclosure manipulations. Students listened to

audio samples from the two audio-recorded instructor self-disclosure lesson scripts (i.e., relevant, $n = 30$ students; irrelevant, $n = 25$ students). After each sample played, the researcher stopped the playback so that students could rate each instructor self-disclosure manipulation. To measure the relevance and perceived realism of the instructor self-disclosures, students were provided with the definitions for these characteristics and then responded to two 7-point semantic differential scales (i.e., “irrelevant/relevant,” “unrealistic/realistic”) for each instructor self-disclosure audio sample. After completing the pilot study, Welch’s independent samples t -tests examined the differences between the relevant and irrelevant instructor self-disclosure ratings for each of the 11 disclosures. Significant differences emerged in the relevance means for all 11 instructor self-disclosures. On average, the 11 relevant instructor self-disclosures were perceived as significantly more relevant compared to the irrelevant instructor self-disclosures with Cohen’s d effect sizes ranging from .89 to 3.13. Thus, the relevance manipulations among instructor self-disclosures were successful. To test instructor self-disclosure perceived realism, two one-sample t -tests were conducted to examine the difference between the self-disclosures and a set test value of moderate realism. The test value was set at 4 because this value reflects a moderately realistic middle score on the scale for perceived realism. In short, all 22 instructor self-disclosures (11 relevant, 11 irrelevant) were above the test value (4) with mean differences ranging from .64 to 2.20. Thus, the pilot study was successful as relevance was successfully manipulated among realistic instructor self-disclosures.

Primary study

For the main study, a total of 288 undergraduate students were recruited from large-lecture communication courses. Participants’ age ranged from 18 to 28 years ($M = 19.82$, $SD = 1.62$). The participants consisted of 132 men, 154 women, and two students who selected “prefer not to answer” when asked to report their sex. For class rank, 113 were first year students, 64 were sophomores, 65 were juniors, 45 were seniors, and one reported “other.” There were 205 who identified as Caucasian, 35 who identified as Middle Eastern, 21 who identified as Black/African American, 16 who identified as Asian/Asian American, six who identified as Hispanic, and five who identified as mixed race. Participants’ grade point average (GPA) ranged from 1.00 to 4.00 ($M = 3.17$, $SD = 1.32$). A total of 24 participants were omitted from analyses because of incomplete surveys, previous experience with the hired instructor, and/or previous participation in the pilot study. Therefore, the final sample size for the primary study was 264 participants (relevant self-disclosure condition, $n = 137$ students; irrelevant self-disclosure condition, $n = 127$ students). To achieve sufficient statistical power of 80% (.80) with a .05 alpha level for the parameters in the model, Fritz and MacKinnon (2007) estimated a minimum total sample size of 162 to detect a small to medium mediated effect (a path = .26, b path = .26). After conducting a power analysis using MedPower (Kenny, 2017), the expected power for the indirect effect (ab) was .98 and the direct effect was .99 (beta for all paths = .26, alpha = .05, power = .80) to achieve a small to moderate effect for a total sample size of 264 participants.

To prepare for the primary study, an instructor was hired to teach the lecture for the two teaching conditions (i.e., relevant and irrelevant instructor self-disclosure). The

instructor was a 25-year-old Caucasian man dressed in business-casual attire. Over the course of six weeks leading up to the primary study, the first author trained the hired instructor to maintain the same level of eye contact, articulation, verbal and nonverbal immediacy, and speaking rate for both the relevant and irrelevant self-disclosure conditions. Students were then recruited to participate in the two-part research study (part 1: online sign-up survey; part 2: live lecture lesson) and were randomly assigned a date and time to attend a live lecture lesson with the hired instructor.

On the date of their assigned lesson, students attended the live lecture in a college classroom. All of the lectures were recorded with a video camera placed in the back of the classroom. The researchers watched the video footage and spoke with the instructor after each live lecture to ensure that there were no confounding variables due to the live student audience. Recorded video footage was examined by the researchers for internal validity purposes to make sure that the instructor maintained consistency in his delivery (e.g., immediacy, eye contact, speaking rate) between the lesson conditions.¹ Neither the researchers nor the instructor felt that there were any confounding variables in either of the lecture conditions. When it was time to begin, the first author provided students with a feedback questionnaire. The first author explained how the instructor was interested in pursuing a career in teaching and asked the students for their honest feedback on his teaching. The questionnaire included a blank page in case students wanted to take notes. Students were told that the instructor would teach a short lesson on affectionate communication. After the lesson, the instructor left the room, and students were asked to complete the feedback questionnaire. After students completed and submitted the questionnaire, the primary study was complete.²

Instrumentation

Scale reliability for all measures was assessed using coefficient omega with a bootstrap confidence interval using 5000 samples (Goodboy & Martin, 2020). Hancock and An's (2020) closed form estimation was used to calculate omega using Hayes and Coutts' (2020) macro. As a manipulation check, a subscale from Cayanus and Martin's (2008) *Teacher Self-disclosure Scale* was used to assess the general relevance of the instructor self-disclosures used throughout the lesson ($M = 5.30$, $SD = 2.17$, $\omega = .96$ [.95, .97]). The relevance subscale is a 5-item measure that included items such as "The instructor provides personal explanations that make the content relevant." This subscale has been widely used in instructor self-disclosure research (e.g., Cayanus & Heisler, 2013; Goodboy et al., 2014). Students responded to the items on the subscale using a 7-point Likert scale.

Student affect was measured using two subscales from McCroskey's (1994) *Instructional Affect Assessment Instrument*. This scale has demonstrated excellent validity in previous research (e.g., Goodboy & Myers, 2015). The stem of the first subscale stated "My attitude about this instructor is:" and used four 7-point semantic differential scales (e.g., "good/bad") to measure students' attitudes toward the instructor ($M = 6.27$, $SD = .94$, $\omega = .78$ [.72, .86]). The stem of the second subscale stated "The likelihood of actually enrolling in another course with this instructor if my schedule would permit would be:" and used four 7-point semantic differential scales (i.e., "likely/unlikely") to measure students' likelihood of enrolling in a course with the same instructor again in the future ($M = 5.72$, $SD = 1.36$, $\omega = .93$ [.91, .95]).

The coherence subscale of the *Clarity Indicators Scale* (Bolkan, 2017) was used to assess perceptions of lesson coherence ($M = 5.44$, $SD = 1.89$, $\omega = .94$ [.92, .96]). The 4-item instrument asked students to respond to statements such as “The instructor went off topic when lecturing” using a 7-point Likert type scale.

To assess students’ short-term recall of lesson material, a 15-item multiple-choice test was administered. These items tested students’ recall of the main points of the affectionate communication lesson. Each question included four possible answers (a, b, c, d). Test questions were coded as (1) for correct and (0) for incorrect, and were scored to reflect a test percentage. Table 1 includes descriptive information for the 15-item test. Table 2 provides the percentage of each question answered correctly and incorrectly on the test.

Covariates

The following variables were included in the model as covariates: general comfort with instructor self-disclosure, GPA, familiarity with the lesson material, and perceived difficulty of lesson material.

The *Student Comfort with Instructor Self-disclosure Scale* (Schrodt, 2013) asked students to indicate “in general, how comfortable you are with instructors who share personal information during class.” Three items (i.e., “uncomfortable/comfortable,” “restless/content,” “worried/at ease”) were included and solicited responses using a 7-point scale format ($M = 5.68$, $SD = 1.35$, $\omega = .92$ [.90, .95]). Schrodt (2013) suggested that students with low comfort toward instructor self-disclosure may dislike personal disclosures and perceive these disclosures as irrelevant to a lesson because they simply want the instructor to teach the content without expressing private details of their lives. Therefore, this covariate was applied during analyses of instructor affect and lesson coherence as endogenous variables.

Three covariates were applied to students’ test scores. The first covariate that was included was students’ GPA ($M = 3.17$, $SD = .58$). Bolkan and Goodboy (2019) found that GPA influences student test performance, and thus it was included in this study. The second covariate was lesson familiarity because it has the potential to influence scores on a short-term recall test (Bolkan & Goodboy, 2019). The 3-item *Perceived Familiarity Scale* (Bolkan et al., 2016) was used to measure students’ familiarity with the lesson material ($M = 2.85$, $SD = .93$, $\omega = .86$ [.83, .90]). The scale used a 5-point Likert type format and included items such as “How familiar were you with the topic before today?” Perceived level of difficulty was the third covariate included on test score because it also has the potential to influence student test performance (Bolkan et al., 2016). A one-item question was created to measure the perceived difficulty of the lesson. The question asked students to report “How difficult was the material to understand?” The scale used a 9-point Likert type format, with higher values reflecting higher difficulty ($M = 2.13$, $SD = 1.32$).

Results

Table 3 provides a correlation matrix of all composite variables included in the primary study.

To determine whether students perceived differences in instructor self-disclosure relevance between the two lecture conditions, students completed Cayanus and

Table 1. Descriptive information for the 15-item test.

Condition	<i>M</i>	<i>SD</i>	KR-20	Range	1/15	2/15	3/15	4/15	5/15	6/15	7/15	8/15	9/15	10/15	11/15	12/15	13/15	14/15	15/15
Relevant Condition (<i>n</i> = 137)	83.21	13.43	.57	46.67–100	0	0	0	0	0	0	1	6	8	9	12	25	27	25	24
Irrelevant Condition (<i>n</i> = 127)	74.06	16.37	.64	20–100	0	0	2	0	3	3	1	6	14	13	25	20	24	10	7

Note. The last 15 columns reflect the number of participants who received each test score (e.g., 12/15 means that the student got 12 questions correct out of 15 test questions).

Table 2. Questions answered correctly and incorrectly on the 15-item test.

Condition	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Relevant Condition (<i>n</i> = 137)															
Correct	92.7	88.3	94.9	97.8	67.9	91.2	70.8	92.7	86.9	82.5	52.6	81.0	84.7	81.0	83.2
Incorrect	7.3	11.7	5.1	2.2	32.1	8.8	29.2	7.3	13.1	17.5	47.4	19.0	15.3	19.0	16.8
Irrelevant Condition (<i>n</i> = 127)															
Correct	87.5	78.9	93.0	92.2	50.0	85.2	64.1	88.3	82.8	70.3	25.0	64.1	79.7	74.2	75.8
Incorrect	12.5	21.1	7.0	7.8	50.0	14.8	35.9	11.7	17.2	29.7	75.0	35.9	20.3	25.8	24.2

Note. Correct and incorrect reflect the percentage test score for each question.

Table 3. Correlation matrix.

Variables	1	2	3	4	5	6	7	8	9
1. Self-disclosure Relevance	–								
2. Affect toward Instructor	–.02	–							
3. Affect Enroll with Instructor	.12	.66 [^]	–						
4. Coherence	.42 [^]	.24 [^]	.32 [^]	–					
5. Self-disclosure Comfort	–.10	.14*	.02	.01	–				
6. GPA	–.09	.13*	.11	–.05	.15*	–			
7. Familiarity	–.06	–.03	.02	–.02	.00	–.08	–		
8. Difficulty	.00	–.09	–.10	–.10	–.13*	–.05	–.11	–	
9. Test Percentage	.21**	.17**	.11	.17**	.14*	.21**	–.24 [^]	–.15*	–

* $p < .05$. ** $p < .01$. [^] $p < .001$.

Martin's (2008) self-disclosure relevance subscale. The results from a Welch independent samples t -test revealed that there were significant differences between the relevant and irrelevant self-disclosure lecture conditions, $t(140) = 12.97$, $p = < .001$, $d = 1.61$, $U_3 = 94.60\%$, with a mean difference of 2.76, 95% CI [2.34, 3.18] between the two conditions. Students in the relevant condition ($M = 6.63$, $SD = .55$) rated the instructor's self-disclosure as more relevant than students in the irrelevant condition ($M = 3.87$, $SD = 2.34$). Therefore, the manipulation check was deemed successful for the teaching experiment.

Hypothesis 1 predicted that a lesson with relevant instructor self-disclosure would create more student affect toward the instructor compared to a lesson with irrelevant instructor self-disclosure. The results of a one-way ANCOVA revealed that there were no significant differences in student affect toward the instructor based on self-disclosure condition, $F(1, 258) = .370$, $p = .54$, $\eta_p^2 = .001$, controlling for student comfort with self-disclosure. Based on estimated marginal means, students in the relevant instructor self-disclosure condition ($M = 6.30$) compared to students in the irrelevant instructor self-disclosure condition ($M = 6.24$) did not report significantly higher ratings of affect toward the instructor.

However, there were significant differences in affect in likelihood to enroll in a future course with the same instructor based on self-disclosure condition, $F(1, 259) = 7.19$, $p = .008$, $\eta_p^2 = .027$, controlling for student comfort with self-disclosure. Based on estimated marginal means, students in the relevant instructor self-disclosure condition ($M = 5.90$) compared to students in the irrelevant instructor self-disclosure condition ($M = 5.51$) reported significantly higher ratings of likelihood to enroll in a future course with the same instructor (if their course schedule would permit it). Hypothesis 1 was partially supported.

Hypothesis 2 posited that relevant instructor self-disclosure (compared to irrelevant self-disclosure) would increase students' test scores, indirectly through lesson coherence. To test this hypothesis, a simple mediation model was estimated using ordinary least squares path analysis, including the four covariates, using 10,000 percentile bootstrap confidence intervals (Hayes, 2018). Controlling for comfort with self-disclosure, GPA, familiarity, and difficulty, the mediation model revealed a direct effect of self-disclosure relevance on students' test performance ($c' = 8.426$ [4.252, 12.600], $c'_{ps} = .549$), but there was no evidence for an indirect effect ($ab = .136$, [–2.170, 2.394], $ab_{ps} = .009$) of relevant instructor self-disclosure on students' test score through lesson coherence. See Figure 1 for the mediation model and path coefficients. Hypothesis 2 was not supported.

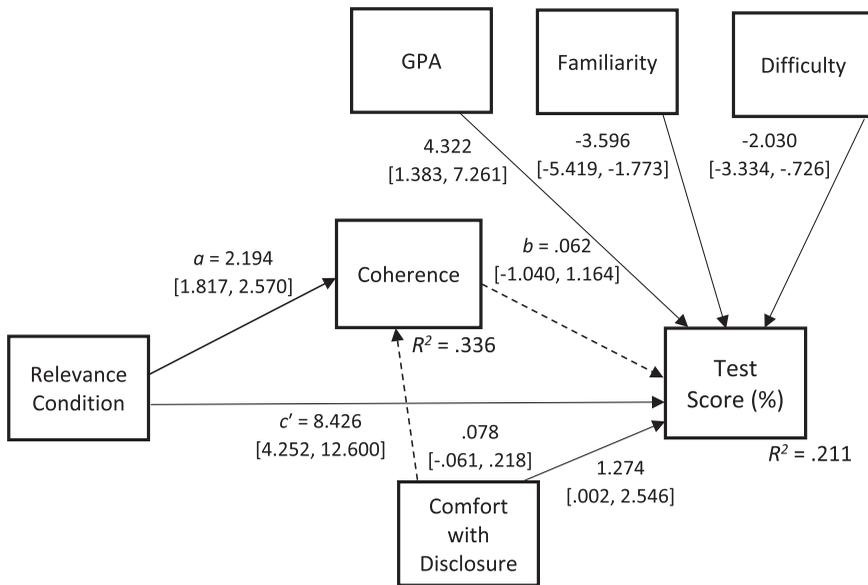


Figure 1. Mediation model.

Note. Path coefficients are unstandardized. Relevance condition represents the lecture conditions that were indicator coded (0 = irrelevant self-disclosure condition, 1 = relevant self-disclosure condition).

Post hoc study

A post hoc study was conducted to ensure the validity of the instructor self-disclosures used in the primary study. To recall from the primary study, the live lectures (i.e., relevant and irrelevant instructor self-disclosure conditions) were recorded for internal validity purposes. These videos were then used to conduct the post hoc validation study. The two lecture recordings were inserted into an online Qualtrics survey. After agreeing to participate in the IRB-approved post hoc study, students were asked to watch and listen carefully to a lecture video on the following page. After proceeding to the next page, the students were randomly assigned to watch either the relevant or irrelevant instructor self-disclosure lesson video. The online survey tools prohibited students from skipping to the next page without viewing the entire lesson video. After viewing the entire lesson video, students then completed scales measuring the appropriateness, plausibility, and typicality of instructor self-disclosure amount as well as instructor self-disclosure valence, honesty, and intent. Participants also provided their demographic information. The final sample size for the post hoc study was 62 participants (relevant self-disclosure condition, $n = 31$ students; irrelevant self-disclosure condition, $n = 31$ students).

Results revealed that students (on average) reported the amount of instructor self-disclosure used in the lecture videos was appropriate, believable, realistic, reasonable, necessary, acceptable, and normal. Moreover, there were no significance mean differences in instructor self-disclosure plausibility amount, typicality amount, appropriateness, negativity, honesty, and intent between the relevant and irrelevant self-disclosure conditions.³ Based on the post hoc study findings, other aspects of instructor self-disclosure did not confound the results of the primary study.

Discussion

There were two main goals of this study. The first goal was to examine how instructor self-disclosure relevance influenced students' affect toward the instructor in a live lecture lesson. The second goal was to examine how relevant (as opposed to irrelevant) instructor self-disclosure created lesson coherence, and in turn, caused students to perform better on a test. Interestingly, students reported similar ratings of affect toward the instructor in both the relevant and irrelevant instructor self-disclosure conditions. However, students reported greater affect in their intentions to enroll in a future course with the same instructor when he used relevant rather than irrelevant self-disclosure. Moreover, instructor self-disclosure relevance did not indirectly influence students' test scores through lesson coherence. Instead, there was a direct effect of relevant self-disclosure (compared to irrelevant self-disclosure); students in the irrelevant instructor self-disclosure condition, on average, earned an 8.42% lower grade on the test despite the lesson coherence. Based on the results, instructors should make sure that their self-disclosures are relevant to the lesson material or else consistent irrelevant self-disclosure may cause significant reductions in student learning.

Whether the instructor used relevant or irrelevant self-disclosure, students reported high levels of affect toward the instructor (on average). These results may be explained by the disclosure-liking hypothesis, which suggests that a person will like an individual more when they choose to self-disclose (Collin & Miller, 1994). In Collin and Miller's (1994) meta-analysis on the disclosure-liking hypothesis, they revealed that the relationship between self-disclosure and liking operates through the information-processing model of attraction. The information-processing model of attraction posits that liking is determined by positive attitudes toward an individual (Ajzen, 1977). The more positive the attitudes are toward an individual, the greater the reports of liking are toward that individual (Dalto et al., 1979). In this study, the instructor's personal disclosures were equally positive (e.g., how much he loves his wife, how he likes to make his daughter's favorite food) in both the relevant and irrelevant conditions so that the effects of self-disclosure valence would not confound the effects of self-disclosure relevance on students' reported affect. Whether or not instructor self-disclosure was relevant to the lesson, students might have reported high affect because offering positive self-disclosures helped students to form a positive attitude toward the instructor as predicted by the information-processing model of attraction.

Regardless of self-disclosure relevance, students reported similar levels of affect toward the instructor in the moment when he was teaching his lesson. However, students reported significantly higher affect in their likelihood to enroll with the same instructor in the future when the instructor used relevant rather than irrelevant self-disclosure (although the effect is small). Students may have appreciated the instructor more because the relevant self-disclosure clarified course content and made it easier for them to understand the main points of the lesson (Downs et al., 1988). Because the relevant self-disclosure made course content clearer to understand, students may have liked the instructor for aiding their learning and were more interested in enrolling with the instructor again. The results also provide evidence as to how irrelevant instructor self-disclosure may cause a slight reduction in affect when students are prompted to think about future classes with the same instructor. Students report that instructors misbehave

when they use irrelevant personal disclosures that stray from the main purpose of the lesson (Kearney et al., 1991). Students may have imagined how this irrelevant self-disclosure could interfere with their learning over the course of a semester and perceived it as a misbehavior. While this experimental study was not longitudinal and the test results would not impact students' current standing, the results provide preliminary evidence that consistent irrelevant instructor self-disclosure could have deleterious effects on affect if students imagine that the instructor will continue to use consistent irrelevant self-disclosure in the future. Irrelevant self-disclosure may not be detrimental to instructor affect in a single lesson (like in this study), but could have potential negative effects if students perceive that an instructor will continue to go off topic in future classes.

Instructor self-disclosure relevance did not operate indirectly through lesson coherence to influence student test scores. Instead, there was a direct effect of relevance (i.e., relevance or irrelevance) on test scores. Given the findings, the direct effect may be explained by how the relevant (as opposed to irrelevant) instructor self-disclosures functioned as examples that reinforced important lesson content.

The direct effect of self-disclosure relevance (i.e., relevant versus irrelevant) on student test scores may have occurred because it reinforced the lesson content through examples. That is, relevant self-disclosures may serve as reinforcing examples to the lecture content. An example is defined as an instance of the lesson concept encountered in practical circumstances (LeFevre & Dixon, 1986). Examples are important because they provide concrete information that helps students learn complex lesson material (Sadovski, 2001). Concrete information evokes mental imagery that contextualizes lesson content into practical situations (Goldstone & Son, 2005). The concrete information present in examples helps students learn lesson material.

In the current study, the concrete and contextual information within the instructor's relevant personal disclosures may be why students scored higher on a test in the relevant self-disclosure condition. In the relevant self-disclosure condition, the instructor taught a lesson concept (e.g., "affectionate feelings and expressions are different"), then used a self-disclosure as an example (e.g., "For my first official date with Emma, I took her to the botanical gardens at the Phipps Conservatory in Pittsburgh. After several more fun and romantic dates, I felt genuine affection towards Emma."), and then explicitly related the relevant self-disclosure example back to the important lesson concept

(e.g., However, I didn't immediately express my affection out of fear of being rejected by her. So for a short time, I felt affection toward Emma but I did not express my affection, which highlights how affectionate feelings and expressions are different.)

The instructor reinforced the lesson concept with a relevant personal disclosure, which helped students understand the material in a practical context that included the instructor. Since instructor content-related anecdotes spark student attention (Keller, 1987) and students generally like learning personal information about their instructors (Gregory, 2005), the relevant self-disclosure may be more effective (compared to an impersonal example) because it simultaneously sparks attention, reinforces the lesson content, and helps students personally connect to the instructor.

Conversely, irrelevant self-disclosure might not have sufficiently reinforced the lesson concepts. The irrelevant self-disclosure condition followed the same format as the

relevant self-disclosure condition with the exception of relating the self-disclosure back to the lesson content. The instructor first taught an important lesson concept (e.g., “affectionate feelings and expressions are different”), then used a self-disclosure as an example (e.g., “For my first official date with Emma, I took her to the botanical gardens at the Phipps Conservatory in Pittsburgh. After several more fun and romantic dates, I felt genuine affection towards Emma.”), but then he went off on a tangent rather than relating the self-disclosure example back to the important lesson concept

(e.g., I took Emma to the Conservatory because she loves flowers. When we were there, we also saw a bunch of miniature Bonsai tree that are grown to mimic the shape and scale of full size trees. I think that those little Bonsai trees are so interesting. I plan to get one for myself.)

Even though the self-disclosure provided positive personal instructor information that students liked, the disclosure did not function as an example to reinforce the most important aspects of the lesson. Thus, students may have had trouble relating the practical information in the irrelevant self-disclosures back to important lesson content.

Another reason for the direct effect of self-disclosure relevance (i.e., relevant versus irrelevant) on student test scores may be explained by how the instructor made the content relevant to the students’ personal needs, interests, and goals. Students are more motivated to learn the lesson material when an instructor makes the content relevant to their everyday lives (Frymier & Shulman, 1995). Muddiman and Frymier (2009) found that the use of personal stories (“instructors tell students personal stories or examples from their lives,” p. 143) is a relevance-enhancing strategy that instructors can employ during instruction. It may be that relevant instructor self-disclosures function as a relevance-enhancing strategy to satisfy students’ personal goals of understanding the lesson because the personal disclosures directly relate back to the important material. Even though students volunteered to participate in this study and the short quiz would not influence their current standing, students still performed significantly better in the relevant self-disclosure condition (compared to the irrelevant self-disclosure condition) because they may have understood how the personal examples would help them learn important lesson information that they could easily contextualize to their own lives.

Implications for theory

One theoretical implication that can be drawn from this study is that instructor self-disclosure may be both a rhetorical and relational behavior, which is in line with Kaufmann and Frisby’s (2017) findings. As aforementioned, Mottet and his colleagues (2006) conceptualized RRGT that posits instructors have both rhetorical goals and relational goals. Even though earlier research proposed that instructor self-disclosure was a relational behavior (Cayanus, 2004), self-disclosure may be able to meet both rhetorical and relational goals in the way that instructor self-disclosure was able to increase student test scores (rhetorical goal) and student affect (relational goal). As a relational behavior, self-disclosure may be used to maintain affect and build interpersonal connections with students. As a rhetorical behavior, relevant instructor self-disclosure may demonstrate that instructors are willing to offer personal information from their lives to help students learn important lesson concepts. Instructors may use relevant personal

disclosures to reinforce important lesson concepts, and in turn, help students better remember test content. Future research should continue to examine instructor self-disclosure as not only a relational behavior to increase student affect but also a rhetorical behavior that can increase student learning.

Another theoretical implication that can be drawn from this study is the causal effect of instructor self-disclosure relevance on student learning. Previous studies examining the general effects of instructor self-disclosure on student learning have resulted in mixed findings with some researchers suggesting that self-disclosure increases cognitive learning (e.g., Goodboy et al., 2014; Stoltz et al., 2014), decreases cognitive learning (Nussbaum & Scott, 1979), or has no effect on cognitive learning (Aubry, 2009). This study provides preliminary causal evidence that self-disclosure relevance plays an important role in student learning. The direct effect of self-disclosure relevance on student test scores prompts instructional scholars to further examine how instructors use relevant self-disclosure as a form of clarity to help students understand and remember important lesson content.

Implications for teaching and learning

Three practical implications can be offered for how instructors should use self-disclosure in the college classroom. First, instructors should do their best to use frequent and consistent relevant self-disclosure to maintain high ratings of student affect. Even though we found that students liked the instructor despite whether his personal disclosures were relevant or irrelevant to the content, student affect decreased when students perceived the instructor as potentially sharing irrelevant self-disclosures in a future course. Previous correlational studies have identified a moderate positive relationship between self-disclosure relevance and student affect toward the instructor (Cayanus & Martin, 2008; Goodboy et al., 2014). Given the previous findings and the results of the current study, students like instructors who use self-disclosures that relate to the lesson.

Second, instructors should present relevant self-disclosures after teaching important lesson concepts. As accomplished in the relevant self-disclosure condition, instructors should first explain an important lesson concept, then use a relevant self-disclosure, and then explicitly relate the self-disclosure back to the important lesson concept. This sequence follows recent research that suggests lesson content should precede practical examples to optimize student learning (Bolkan & Goodboy, 2019). Providing important lesson information before practical information allows students to form a basic idea of the lesson concept, which is then more easily transferred to a wide variety of different content-specific situations (Bassok & Holyoak, 1989). By following this suggested sequence, instructors may be able to use relevant self-disclosure to reinforce important lesson concepts and optimize student learning.

Third, instructors should avoid frequent and consistent irrelevant self-disclosure because it may lead to reductions in student learning. Some instructors already intuitively know not to constantly share off topic personal information during instruction (McBride & Wahl, 2005), but some instructors may not, according to instructor misbehavior research (Goodboy & Myers, 2015). In this study, frequent and consistent irrelevant instructor self-disclosure interfered with learning and made it harder for students to focus on the important lesson content that they needed to remember for the test.

Compared to the relevant instructor self-disclosure condition, students in the irrelevant self-disclosure condition performed significantly worse on the test (−8.42%), which is nearly a full letter grade deduction. Although this study was only one short lesson with a simple 15-item multiple-choice test, the consistent use of irrelevant instructor self-disclosure over the course of a semester may potentially compound the detrimental effects on student learning and further reduce students' ability to perform well on tests of retention. However, educators should know that this study's results do not necessarily mean that an infrequent irrelevant self-disclosure is harmful to student learning. There may be a threshold effect of how much irrelevant instructor self-disclosure that students will tolerate before there are reductions in student learning. Because this study either examined an instructor using all relevant or all irrelevant self-disclosures, we cannot claim that *some* irrelevant self-disclosure is harmful to student learning. Future research should examine how instructors may be able to occasionally share an irrelevant self-disclosure during instruction as long as it is balanced out with an appropriate amount of relevant self-disclosure.

Limitations and future directions

The first limitation was that this study did not have a mixed treatment condition (i.e., a balanced ratio of relevant and irrelevant instructor self-disclosure). The instructor shared either all relevant self-disclosures or all irrelevant self-disclosures during instruction. We designed the experiment in this way to isolate the effects of self-disclosure relevance on student outcomes. However, it is unlikely that the everyday instructor shares all relevant or all irrelevant self-disclosures when teaching. Instructors, on average, share 10 self-disclosures per 50-minute classroom lecture (Downs et al., 1988). It makes sense that an instructor's self-disclosures would be a blend of both relevant and irrelevant self-disclosures. The lack of a mixed treatment condition limits the generalizability of the findings because we do not know how the students would have performed if the instructor shared a balanced ratio of relevant and irrelevant self-disclosure.

The second limitation was that this study used only one instructor to teach the lessons. McKenna-Buchanan and his colleagues (2015) assert that instructor self-disclosure is “made more complicated for teachers with potentially stigmatizing private information to share, as disclosing such information might undermine the benefits traditionally associated with self-disclosure in the classroom” (p. 281). Given his status in American culture, the white male heterosexual instructor in this study may have been privileged to reap the benefits of his personal disclosures compared to instructors from minority populations. Moreover, it is unclear whether the message feature (i.e., relevant or irrelevant instructor self-disclosure) or the message source (i.e., this particular instructor) led to the effects on student affect and learning. Health communication researchers argue that variations in message design must be considered during persuasive message experiments in order to maximize persuasiveness and enhance the generalizability of the findings (see O’Keefe, 2015 for a review). Similarly, instructional communication researchers should consider message design variations when examining instructor messages to enhance generalizability and maximize potential positive student outcomes. Future research should experimentally vary other message characteristics such as self-disclosure timing as well as include multiple message sources from different backgrounds

(e.g., gender, teaching experience, cultural background, etc.) to better understand the effects of instructor self-disclosure use in the classroom.

The third limitation is that the participants may have been unintentionally primed to focus on the instructor rather than the lesson. Before the instructor began his lesson, a researcher introduced the instructor by stating, “The professor that you will have today is interested in pursuing a career in teaching. The professor has asked for your feedback on his teaching.” This introductory statement may have primed participants to focus on the instructor’s behaviors and remarks rather than his lesson. Researchers have found that priming statements can influence participants’ responses and impact study results (Smith & Trope, 2006). The researcher’s statement may have influenced students’ responses in ways that were not controlled for in this study.

Future research should examine the effects of instructor self-disclosure in a variety of different topics and contexts. For this study, the topic of affectionate communication was chosen for three reasons: the topic might be interesting to students, the topic should be unfamiliar to students in the introductory communication classes, and the topic would be conducive to instructor self-disclosure. However, it is possible that the conduciveness of affectionate communication to instructor self-disclosure may have led students to perceive all instructor self-disclosures as coherent (i.e., on topic and necessary to learning the lesson content), whether the instructor related his personal disclosures back to the lesson content or not. It is unclear whether instructors can share relevant self-disclosures about more demanding lesson topics (e.g., chemistry, mathematics, astronomy) to aid student affect and learning. How would an instructor use a relevant self-disclosure to help students better understand a lesson on black holes? Instructor self-disclosure may not be appropriate or effective in all learning contexts. Future research should incorporate different lesson topics to see if there are similar benefits to student affect and learning.

Future research should also experimentally test the influence of self-disclosure valence on student affect and cognitive learning. Several correlational studies have identified a positive relationship between positive instructor self-disclosure and student affect (Cayanus & Heisler, 2013; Cayanus & Martin, 2008). When instructors share positive self-disclosure (as opposed to negative self-disclosure), students report increased feelings of affect toward an instructor (Sorensen, 1989) and greater intention to take another class with the same instructor (Goodboy et al., 2014). In this study, instructor self-disclosure was consistently positive in both conditions to control for any effect that valence would have on student affect. However, these highly positive disclosures may have ultimately led to higher reports of student affect in general. Future research should examine if and how instructor self-disclosure relevance and valence interact to influence student affect and learning. One might assume that positive/relevant instructor self-disclosure would be most effective, whereas negative/irrelevant instructor self-disclosure would be least effective. However, how would positive/irrelevant and negative/relevant instructor self-disclosure influence student affect and cognitive learning? Moreover, it is likely that most instructors would use a combination of both relevant and irrelevant self-disclosures over the course of a semester. Would an occasional irrelevant self-disclosure negatively impact students’ cognitive learning? Future researchers should simultaneously examine multiple instructor self-disclosure dimensions and combinations of the same dimension (i.e., relevant and irrelevant) to better understand this important teaching behavior.

Future studies should examine possible threshold effects and the ratio between relevant and irrelevant instructor self-disclosures used in a lesson. Even though instructor self-disclosure amount is associated positively with student affect (Cayanus & Martin, 2008) and perceived cognitive learning (Goodboy et al., 2014), there may be a threshold effect in which students will only tolerate a certain amount of relevant/irrelevant instructor self-disclosure over a short period of time before they feel that the instructor should just stick to the content. Moreover, the current study involved the instructor sharing 11 personal disclosures that were either all relevant or all irrelevant to the lesson content. This study did not examine the ratio of relevant to irrelevant instructor self-disclosures, so it is unclear how often an instructor can share an irrelevant self-disclosure without harming student learning. There may be a golden ratio by which a certain amount of irrelevant self-disclosures may be acceptable if it is balanced out with a frequent amount of relevant self-disclosure (e.g., for each irrelevant self-disclosure, be sure to use five relevant self-disclosures). Therefore, future researchers should examine how much irrelevant instructor self-disclosure is tolerable before it leads to detriments in student affect and cognitive learning.

Notes

1. The PowerPoint presentation, lesson scripts (with the highlighted instructor self-disclosures), 15-item test, self-disclosure times, and lecture video links can be found at <https://figshare.com/s/dfc0c6827e66261ca6d8>
2. These data were collected February 19–20, 2020 in a traditional in-person classroom environment. Data collection took place approximately one month before many higher education officials became concerned with the spread of COVID-19 and limited in-person classes. The pandemic has led to lifestyle changes that have negatively impacted college students' mental health (Huckins et al., 2020). Given that this study was conducted in a traditional classroom setting before the pandemic, future researchers should consider controlling for student stressors related to the pandemic, as teaching–learning studies must account for changes to higher education (e.g., COVID-related anxiety and/or stress, online teaching, etc.).
3. The full post hoc validation study can be found at <https://figshare.com/s/dfc0c6827e66261ca6d8>

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