Coming to Terms Will Do It: Students Engaging With Climate Change Through Sensemaking and Collective Efficacy Perceptions

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Keywords: climate change communication, fear appeals, coming to terms, instructional communication, crisis communication

Abstract: Within climate change instruction, effective instructional crisis communication is necessary to attain cognitive, affective, and behavioral learning outcomes so students comprehensively learn the reality and implications of this planetary crisis. I locate this learning as coming to terms with climate change. This study explores how students affectively and cognitively learned to come to terms with the immense threat of the climate crisis outside their initial exposure to climate change fear appeals communicated in their classrooms. Drawing from interviews and focus groups with college students, I found students came to terms with climate change outside their classrooms by coping with the immense threat while enacting sensemaking with their peers. These findings suggest coping and sensemaking are crucial for students to come to terms with climate change after instructor-delivered fear appeals to access the efficacy needed to face this planetary threat. Ultimately, this study advances instructional crisis communication by providing insight into student to student out-of-classroom communication and how it affects cognitive and affective learning outcomes concerning climate change.

Introduction

"To survive climate change, animals must either migrate, adapt, evolve, or die." An image on the projector screen accompanies this assertion, depicting a ravenous polar bear scrabbling with a seagull on a landscape devoid of ice or snow. The wildlife biology professor grimly eyes the 70 students before him, letting the moment's impact sink in for before dismissing the class. I pull my gaze from the unnerving image and examine the students leaving the classroom. Most seem to be visibly shaken by the frightening lecture; some woodenly gather their belongings while others stare blankly as they process

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the lecture's implications. I shift my scrutiny to the professor and think, "Why did he make his lecture so fearful?" Interestingly, I notice his dour expression soften to one of satisfaction and I follow his gaze to the students exiting the room. Most are leaving in clusters, talking to each other in hushed tones. I ask myself, did the professor use fearful communication knowing the students would discuss it afterward? If so, what could be gained by the students talking about the lecture among themselves, outside of the classroom? I look to the professor and wonder, "What does he know that I don't?"

Instructors have an exigent duty to communicate honestly to students about the reality of the climate crisis and the emergent risks that may well prove catastrophic. Yet, even in the mildest instruction, as Reser and Bradley (2017) caution, all climate change communication contain "inherently, frightening warning messages, quite apart from any intentional fear appeals" (p. 1). Whether or not instructors teaching about climate change are deliberately employing fear appeals,[1] the subject matter carries dire implications for the well-being of life on our planet. Moreover, although instructors use fear appeals with good intentions, "dramatic, sensational, fearful, shocking, and other climate change representations" tend to result in people "feeling helpless and overwhelmed when they try to comprehend their own relationship with the issue" (O'Neill & Nicholson-Cole, 2009, p. 375). Nevertheless, climate change instructors must cultivate "in young people an integrated understanding of the many aspects of the climate issue, hopeful visions for the future and a conviction that it lies in their power to shape the future" (Schreiner et al., 2005, p. 43). I approach this cultivation as *coming to terms* with climate change (Reser & Bradley, 2017), where students learn comprehensively (affective, cognitive, and behavioral) about the "reality and implications of climate change" (Reser & Bradley, 2017, p. 24) to meaningfully engage with the crisis.

Essentially, I argue that effective instructional crisis communication focused on attaining cognitive, affective, and behavioral learning outcomes will help students *come to terms* with climate change and their role in addressing it. As T. L. Sellnow et al. (2012) contend, instructional communication should extend into crisis situations, as effective instructional messages are critical to achieving appropriate crisis responses. Yet, instructional crisis communication on climate change may be constrained by the crisis's confounding qualities. For many students, climate change is spatially and temporally overwhelming (Verlie, 2019), as well as invisible (Schreiner et al., 2005). In addition, potential impacts of personal contributions seem insignificant and controversies over moral, ethical, and political dimensions are immense (Owens et al., 2017). Consequently, students may (a) struggle as they attempt to accurately understand the vastly scaled subject matter (cognitive), (b) believe they cannot engage in the actions necessary to influence positive change (affective), and (c) lack the skills needed to engage in their own climate change communication (behavioral). However, effective instructional crisis communication may surmount these obstacles by focusing specifically on strategic messages that achieve these learning outcomes and, consequently, help students come to terms with climate change.

This study explores how students learn to come to terms with climate change outside the classroom after instructor-delivered fear appeals. As D. D. Sellnow et al. (2015) argue, if a primary outcome of instructional communication is to foster learning (affect, cognitive, behavioral), then it undeniably occurs in many contexts beyond traditional classrooms (p. 427). I particularly focus on how students conduct this out-of-class communication (Myers, 2017)—yet, not with their instructors, but instead

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1. A fear appeal is a "persuasive communication attempting to arouse fear in order to promote precautionary motivation and self-protective action" (Ruiter et al., 2001, p. 614). See Reser and Bradley (2017) for a review on climate change fear appeals.

amongst their class peers. More specifically, I contend that understanding how students come to terms with climate change by communicating with their peers outside the classroom may inform instructional crisis communication practices within the classroom. Additionally, while very little research exists specific to climate change fear appeals used in classroom settings, broader studies that do exist tend to focus on the participant's initial exposure to a fearful message and its immediate effectiveness (Chen, 2016; Feldman & Hart, 2016; Li & Huang, 2020; Skurka et al., 2018). To date, we know less about how people come to terms with climate change days, weeks, or months after experiencing these fear appeals; particularly when these fearful climate change messages are introduced in the classroom. Thus, I am concerned with how students come to terms with climate change when they engage in the world's uncertainties outside the classroom.

For this project, I investigated how 19 undergraduate students pursuing a minor in a climate change program came to terms with climate change through achieving learning outcomes outside of class. Namely, I focused on affective and cognitive learning outcomes because "affective and cognitive outcomes are critical catalysts for motivating people to engage in the desired behavior" (D. D. Sellnow et al., 2017, p. 4). Regarding affective learning, or the "the acquisition and development of feelings, values, and beliefs" (Hauenstein, 1998, p. 59), I found students affectively learned collective efficacy perceptions to cope with climate change. This study understands collective efficacy as affective when learned as an internal experience and behavioral when actions and skills, learned from instruction (Waldeck et al., 2010), are used to participate in shared efforts to address climate change. Concerning cognitive learning, I found students acquired, comprehended, applied, analyzed, synthetized, and evaluated climate change information (Bloom, 1956) through dialogic interactions with their peers outside of class; this communication aligned with the sensemaking frameworks found in organizational communication. Yet, I extend sensemaking to instructional communication by emphasizing how cognitive learning is immanent to creating sense dialogically through iterative interactions. These findings suggest coping and sensemaking are crucial for students to come to terms with climate change after instructor-delivered fear appeals to access the efficacy needed to face this planetary threat. Ultimately, this study advances instructional crisis communication by providing insight into student to student out-of-classroom communication and how it affects cognitive and affective learning outcomes concerning climate change.

Climate Change Instructional Crisis Communication

It is generally understood in the literature that crisis is risk manifested (Coombs, 2009) and that crisis is "a disruption of activities that, potentially, lead to devastating consequences" (Kuntzman & Drake, 2016, p. 3). Ulmer (2015) clarifies further that crises can be intentional (e.g., terrorism) or unintentional (e.g., natural disasters). Coombs (2009) divides crisis communication into three phases: pre-crisis, crisis response, and post-crisis. Pre-crisis involves prevention, crisis concerns directly addressing the crisis, and post-crisis includes learning from the crisis in its aftermath. The climate crisis paradoxically encompasses all three phases at once. It is both a "crescive" crisis because it accumulates slowly and over lengthy time scales (Beamish, 2002, p. 4) and also an acute crisis through extreme weather that leads to natural disasters (Kuntzman & Drake, 2016).

Instructional crisis communication is an intersecting, burgeoning field that develops novel insights in a critical area of scholarship. Recently, scholars have noted the necessity of instructional communication within crisis situations to "aid the human condition and, at times, actually save lives" (T. Sellnow &

Sellnow, 2010, p. 124). Indeed, as Coombs (2009) contends, "Crisis communication would benefit from research that addresses specific instructing information concerns" (p. 106) as "We can never diminish the critical role of instructing and adjusting information" (p. 113) in crises. T. Sellnow and Sellnow (2010) take up this call, arguing that effective instructional messages must acknowledge Kolb's (1984) entire learning cycle of thinking, feeling, doing, and reflecting with particular attention needing to be placed on feeling and doing. T. L. Sellnow et al. (2012) follow the call as well, finding that "tailoring [instructional] messages based on learning style preference, gender, and group type will maximize their persuasive impact" in crisis situations (p. 641). Instructional crisis communication is an expanding field, one with potential for further growth—perhaps found in its connection with climate change.

Significant to instructional crisis communication, climate change bears characteristics that obstruct learning outcomes. Climate change is spatially and temporally overwhelming, which Verlie (2019) describes as an experience "of being rendered incapable [behavioral]," and one that "emerges from encounters with problems of an incomprehensible [cognitive] and possibly insurmountable scale, ones that do not just disable, but dissolve our sense of self [affect]" (p. 755). Another characteristic is that climate change is invisible—fossil fuel emissions are not discernable—and therefore it "may be difficult to understand [cognitive] and believe [affective] the presence of the problem" (Schreiner et al., 2005, p. 9). An additional issue impacting student learning outcomes is how individual contributions seem insignificant. Schreiner et al. (2005) note that "Young people may experience that [climate change] is out of reach of their actions [behavioral]" (p. 10). Despite students' attempts to lower their individual carbon footprints, "the total global emission of greenhouse gases will continue to increase, and one's feeling of powerlessness [affect] may increase in pace with the public focus and concern" (p. 10). Last, climate change carries socioscientific controversies with moral, ethical, and political dimensions and "Avoiding such issues obscures the nature of science and leaves students to their own devices as to how they reconcile a value-free [affect] understanding of science with the value-laden realities of socioscientific issues" (Owens et al., 2017, p. 48). Climate change instructional crisis communication is marked by these significant constraints on learning outcomes, which must be surmounted for some degree of learning to transpire.

Affective Learning Through Collective Efficacy and Coping

Efficacy theories provide insight into how students may, through affective learning, acquire beliefs that their actions can lead to desired outcomes in the context of climate change. Bandura (1999) names two types of efficacy. First, perceived self-efficacy "refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Second, whereas self-efficacy is belief in an individual's ability to affect change, perceived collective efficacy "is defined as a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" (p. 477). Collective efficacy, then, is the shared belief that a group's collective actions can bring forth desired changes in their experience, local or global. As Bandura (2000) explains:

> People's shared beliefs in their collective efficacy influence the types of futures they seek to achieve through collective action, how well they use their resources, how much effort they put into their group endeavor, their staying power when collective efforts fail to produce quick results or meet forcible opposition, and their vulnerability to the discouragement that can beset people taking on tough social problems. (p. 76)

When applied to environmental crises like climate change, it may be more effective for instructional crisis communication to focus on students learning collective efficacy rather than self-efficacy. Although a strong sense of self-efficacy informs one's capacities for collective efficacy (Fernández-Ballesteros et al., 2002), self-efficacy alone may be inadequate in the context of global environmental crises; the systemic nature and planetary scale of these issues eclipse an individual's capacities for action. Therefore, Homburg and Stolberg (2006) advise "it may thus be more appropriate to assess people's beliefs in collective efficacy as opposed to individual efficacy" (p. 7). Indeed, students often feel their individual efforts are insignificant in the face of climate change (Schreiner et al., 2005); therefore, as Armstrong et al. (2018) suggest, "collective actions may feel more appropriate given the scale of the problem" (p. 64). Overall, it seems fostering collective efficacy in instructional crisis communication is more suited to meeting the demands of the climate crisis than self-efficacy.

In addition to providing affective pathways for meaningful action, instilling collective efficacy through instructional crisis communication may also help students cope with the enormous threat of climate change. Coping is "a process contributing to the reduction of uncertainty and complexity of a situation" (Homburg & Stolberg, 2006, p. 2). Coping can be viewed through the lens of collective efficacy, where collective action effectively leads to desired outcomes that reduce uncertainty and complexity by "restor[ing] a sense of understanding and order" (T. L. Sellnow et al., 2012, p. 634) in a crisis situation. In fact, Homburg and Stolberg found that coping with global environmental problems is determined more by collective efficacy than self-efficacy. Centering on students, Chawla and Cushing (2007) write, "Left to themselves, young people can easily feel disempowered by the scale of environmental problems" (p. 446). These scholars continue, noting that educators can empower students by providing the opportunities "for social and environmental change" they need "to acquire a collective sense of competence" (p. 446). Armstrong et al. (2018) would agree that instructors play a pivotal role in student coping. They advise educators to "avoid engaging terror management responses" (p. 78) by approaching climate change through collective action frames. Altogether, instructional crisis communication should foster affective learning so that students acquire collective efficacy not only to provide actionable beliefs, but to also aid in the coping needed to manage climate change fear responses.

Cognitive Learning Through Sensemaking

Sensemaking may provide a theoretical framework for how students achieve cognitive learning outcomes concerning climate change to access efficacy. Sensemaking is particularly suited to cognitively learning about a global crisis because this communication "allows people to deal with uncertainty and ambiguity by creating rational accounts of the world that enable action" (Maitlis, 2005, p. 21). Sensemaking is a social, discursive, and active process (Weick, 1995) that is both retrospective (Weick, 1995) and prospective (Gephart et al., 2010). In other words, people sensemake with others through communication to (re)construct meanings of the past, present, and futurities. Sensemaking consists of people collectively generating and shaping one another's sense through ongoing, iterative, and repeated cycles.

Sensemaking is a four-step process which involves ecological change, enactment, selection, and retention. Weick et al. (2005) describe these four steps as the "reciprocal exchanges between actors (Enactment) and their environments (Ecological Change) that are made meaningful (Selection) and preserved (Retention)" (p. 414). When changes are perceived in the environment, data is organized through noticing and bracketing cues. Then these nascent categories are narratively parsed into meaningful chunks through the creation of plausible stories. The narratives are retold to reinforce the sensemaking

and provide more substantial guidance for future interpretation and action. Indeed, narratives are central to the sensemaking process as they reveal "not only who is involved and what they are doing but also the meanings that they are constructing in the process" (Maitlis & Christianson, 2014, p. 81).

Scholars have noted the need for sensemaking in crisis situations. As Gephart Jr (2007) argues, crises "clearly require sensing and sensemaking if they are to exist as meaningful phenomena to members of society" and that "a crisis exists only when certain events or cues are sensed or noticed and then interpreted as crises by sensemaking" (p. 126). Climate change, then, must be perceived as a crisis via sensemaking before meaningful action can be taken. Gephart Jr continues, noting how sensemaking can provide "important insights into how people construct and interpret crisis events" (p. 155). Exploring the sensemaking of climate change is therefore important to understanding the meaning making around this crisis. Additionally, engaging in sensemaking is crucial to climate change because when it is inadequate, probabilities increase "that [a] crisis will get out of control" (Weick, 1988, p. 305). The climate crisis is particularly vexatious with sensemaking. Climate change's qualities include "its immense complexity and—because it is insufficiently understood and never entirely predictable—its resulting uncertainty" (Moser, 2010, p. 35). If climate change is to exist as a recognizable crisis—one that impels appropriate action—then its cues must be interpreted despite its cognitively perplexing characteristics.

In this study, I extend sensemaking to instructional communication by drawing attention to cognitive learning and its immanence in communicative meaning making. Although sensemaking is primarily studied in organizational communication contexts, its concern with "the crucial role communication plays in influencing human cognition" (Malphurs, 2012, p. 61) is applicable to environmental education (Hulland & Munby, 1994) and instructional communication through the cognitive learning domain. Cognitive learning involves comprehending, synthetizing, and evaluating information while sensemaking can be understood as the role people play in "constructing the very situations they attempt to comprehend" (Maitlis & Christianson, 2014, p. 58). Sensemaking, then, involves one using information at the same time they situationally learn that information. Indeed, Maitlis and Christianson (2014) explain in a review on the sensemaking literature that this communicative process is critical to individual learning. Further, Catino and Patriotta (2013) conclude from a study of the Italian Air Force that individual sensemaking affects learning outcomes. Sensemaking, then, can be approached as an act of cognitive learning.

To find theoretical frameworks that complements students engaging in dialogic interactions around environmental issues, I turn to interpersonal and ecological sensemaking. First, interpersonal sensemaking is a process whereby individuals attend to interpersonal cues, which include behaviors and actions, to make sense of their organizational realities (Wrzesniewski et al., 2003). Second, ecological sensemaking creates a sense of environmental processes and conditions (Whiteman & Cooper, 2011). While Whiteman and Cooper focus sensemaking at the micro level, this study examines ecological sensemaking at both local and global scales to account for students making sense of the science surrounding climate change and the social dynamics that generate and perpetuate the crisis and its consequences—as well as the attendant controversies (Owens et al., 2017).

Taken together, collective efficacy and sensemaking offer a lens to study how students learn (affectively and cognitively) to come to terms with climate change. This approach extends instructional crisis communication research in two ways: first, by considering efficacy primarily from a collective lens as a coping mechanism and second, by connecting ecological with interpersonal sensemaking as a means

for cognitive learning around an ever-emerging ecological crisis via interactions with peers. Therefore, I propose the following research questions:

RQ1: How do students affectively learn to cope with the immense threat of climate change with their peers outside the classroom?

RQ2: How do students cognitively learn about the immensity of climate change with their peers outside the classroom?

RQ3: Does affectively and cognitively coming to terms with climate change outside the class afford students the efficacy needed to engage with this planetary crisis?

Methods

The participants of this study are 19 undergraduate students who were enrolled in a program centered around the study of climate change named the Climate Change Studies (CCS) minor at a U.S. university; to note, this program only offers a minor and not a major. The CCS minor, which has roughly 70 students each semester from a wide variety of disciplinary backgrounds, requires nine courses: The Introductory to Climate Change course, and two courses each in the physical, society, and solutions areas. Students are also given ample opportunities to interact with one another through symposiums and gatherings to foster a sense of community. The CCS minor offers a unique opportunity to research students coming to terms with climate change who are consistently exposed to its immense threat in class.

I received the University's institutional review board approval for all research procedures. Access was then negotiated to the study by asking permission from the director of the CCS minor to interview students enrolled in the minor. I undertook this request with respect and sincerity due to the grief students may feel from climate change and its consequences (Cunsolo & Ellis, 2018). Out of the roughly 70 students in the minor, the CCS director provided a contact list for 20 students, 12 of whom consented to being interviewed. Amended permission was received from the University's institutional review board to conduct focus groups. Again, I approached the director and requested access to more students for the focus groups. I received a list of another 15 students whom I emailed; seven students consented to participate in focus groups. In total, the students' ages ranged from 18–32 years; 10 identified as female and nine as male. The students represented varying progress through the minor: five had taken the Introduction to Climate Change class, seven had progressed to some degree throughout the minor, and seven had finished the program. The students were assured of their confidentiality and signed consent forms.

My multi-methodology began with the perplexing question of how people affectively, cognitively, and behaviorally come to terms with a threat so vast it is on a planetary scale. I conducted two sets of data gathering. First, 12 respondent interviews were conducted, 20–45 minute in length, over 2 weeks. Using an interview script, students were asked to speak of their peer and dialogic interactions within the CCS minor. Questions were thematically designed to generate data but also dynamic enough to foster an interpersonal relationship with the interviewee (Kvale & Brinkmann, 2009). I interviewed students until I had achieved theoretical saturation of the data (Saunders et al., 2018). Second, following my findings in the interviews that students were enacting sensemaking, I conducted focus groups to specifically discover how people sensemake. Two separate focus groups were conducted; the first had two students

and the second had five (one student from the former group mistakenly attended the latter group—therefore the former focus group consisted of only two students). Focus groups were conducted to empirically examine and capture the sensemaking process *in vivo* (Tracy, 2013). In other words, I sought to record genuine sensemaking from the students in real time. Sensemaking was triggered (Maitlis & Christianson, 2014) in the focus groups through posing questions that highlighted the ambiguity and uncertainty of climate change.

Interviews and focus groups were recorded, transcribed, and then coded. For the interviews, first-cycle coding was used by examining the data and capturing the students' words and phrases, known as In Vivo Coding (Saldaña, 2009), to illuminate the students' own voice in describing their communication practices. I then second-cycle coded—Pattern Coding—to organize the previous codes into distinct categories to tease out the theoretical constructs found in the data. For the focus groups, In Vivo Coding was used again to clarify the sensemaking processes in action. After coding both the interviews and focus groups, I identified "significant and multi-faceted" (Tracy, 2013, p. 207) exemplars that embodied the data's essence.

Results

These results are summarized, first, in terms of how students, following climate change classes, attend to the overwhelming fear of climate change through coping collectively with their peers. Second, I report how students grappled cognitively with climate change's immensity through sensemaking with their peers. Last, I discuss how students sought collective efficacy narratives from their peers, mentors, communities, and the media.

Affective Learning Through Collective Efficacy and Coping

Students affectively learned collective efficacy perceptions to cope by (deliberately or not) perceiving their community, whether the minor, their city, or country, to be active in mitigating climate change; this in turn informed their capacity to cope with climate change after classes on that subject matter. When asked how a sense of community aids in attending to climate change, one student responded:

> It helps knowing more people are worried about it. That might be one thing that drew me to the [CCS] minor. Coming to this university and seeing so many students and professors who had dedicated themselves to climate change helped me feel better about it.

This student coped through seeking collective efficacy in the will to address climate change in the university's students and faculty. Another student said, "As long as I am seeing more people every day creating unique ways of impacting climate change, then I feel hope from that positive trajectory." Students described similar experiences where, by finding evidence of collectivity, they gained efficacy perceptions that informed capacity to cope. In contrast, students unable to find evidence of collectivity found that their overwhelming fears remained intense. One student grated, "I need meaningful one-on-one conversations about how climate change is hanging over us all. But no one wants to talk about that, especially the professors." This student did not discover evidence that the collective will could impact the immensity of climate change as her community did not desire to speak about the potential ramifications of climate change. They, and other students with similar perceptions, were less able to cope with climate change than those who had affectively learned collective efficacy perceptions.

Validation of the Fear From Climate Change

Students also coped with climate change after their classes by seeking and offering emotional validation from their peers collectively. Students found relief when other students acknowledged their fears as valid and acceptable. When asked of the importance of talking with peers after fearful climate change lectures, a student described her experiences walking home after class as helpful, explaining:

> It helped all of us walking together after class to know that we were allies to each other in the intensity of learning this information, which was really cool to feel that we could learn about something and connect with it intellectually and emotionally through one another. I think it was really important that we could share in the fear of climate change.

The student felt their fears were manageable when others acknowledged and even shared their affective intensity. Other students stated the need for others to "lift them up" after a heavy climate change lecture, or how "just knowing that other students are worried about climate change" gave relief from their intense fears. Students commonly stated in the interviews that they sought this sense of validation from their peers. When their fears were collectively validated, students were more at ease with their fear responses, making them less overwhelming.

Students were less able to cope when their fears were not collectively validated. When asked if they discuss fearful climate change classroom messages with their peers outside of class, a student said:

> I do not feel like I am "one of them" with the other students. I believe that they are slightly terrified of the obvious pessimism that I exude . . . I feel that we are fucked with climate change and nobody wants to listen to that.

This student did not have validation from their peers; consequently, their perceptions of climate change tended to be fatalistic. Similarly, a student shared, "I do not feel like I can have a meaningful conversation with anyone about the state of the world." Students who did not have their fears validated tended to be more pessimistic and closed off to possible solutions to mitigate climate change. Significantly, students who did perceive a collective will to mitigate climate change and experienced validation of their fear responses were more likely to cope, which informed their capacity to cognitively come to terms with climate change through enacting sensemaking with their peers.

Cognitive Learning Through Sensemaking

Students cognitively learned of climate change following their classes through engaging in sensemaking with their peers. The sensemaking proceeded through two phases. First, students enacted sensemaking with their peers to make sense of their relationship with climate change and, second, once plausibility was (temporarily) established and sensemaking was therefore concluded, the students forwent sensemaking with their peers in favor of addressing the crisis.

Students often stated the difficulty in holistically understanding climate change. When asked to describe their grasp of the issue, a student stated, "Climate change is a hard thing to comprehend sometimes because you feel so powerless in the whole thing." Students were driven to make sense of the immensity of climate change and their relationship to it to establish cognitive learning with the crisis that would enable positive action.

Students enacted sensemaking processes typically in their freshman, sophomore, and into their junior years at college. By their senior year, students tended to have concluded their sensemaking of the issue, at least regarding the current sense surrounding the state of the planet, its climate, and its anthropogenic perturbation. Students' sensemaking was characterized by dialogic interactions outside of class where they would share and exchange pieces of information they had learned in class, bouncing their sensemaking off one another. An example of such dialogic interaction follows, simulated through a focus group.

Example of Enacted Sensemaking

The focus group consisted of two students, whose pseudonyms are Amber, a junior who was still in the sensemaking process, and Jasmine, a senior, who had concluded sensemaking. I asked how the United States will recover international trust following the Trump administration's inaction on climate change. The students responded with sensemaking. Amber said that it is difficult because people who support President Trump do not accept the scientific consensus on climate change and tend to label opposing perspectives as "fanatical." Jasmine agreed, saying that a lot of people have opposing views, which isn't helped by media giving equal airtime to skeptics. Amber replied that she cannot understand how people trust climate change deniers. Jasmine responded by noting how people latch onto their beliefs and values. Amber agreed, speaking to the difficulty of connecting to people's unique worldviews when those life framings are so implicit they may not even be able to articulate those views. Jasmine suggested that even with that difficulty, there is the possibility of connecting to others through shared commonalities. Amber countered by offering a narrative of her mother not accepting climate change because she could not see its evidence in her lifetime. The conversation then shifted to another topic.

In the above example of sensemaking, Amber did not find a resolution to the question posed in the beginning. However, that was not the purpose of the sensemaking she enacted with Jasmine. Indeed, the purpose was not to find comfort or peace with climate change, but to find a measure of sense surrounding the crisis. Amber's sense of climate change shifted when she agreed with Jasmine that some people are more influenced by their beliefs and values on a topic than the scientific consensus. Then, when Amber offered her own interpretation of Jasmine's statement, she enacted her own, now furthered, sense. Intriguingly, the sensemaking in this instance did not seem to benefit Jasmine as much considering the high level of sense she already held on the crisis, a topic I will explore when I discuss the conclusion of student sensemaking.

The Enactment of Sensemaking

To cognitively come to terms with climate change, students conducted sensemaking separate from their exposure to the information received in their classes. When asked how they talked to their peers about their climate change courses after class, a student said:

> I think a lot of the conversations while walking to dinner were reflective. We would learn about climate change in class. And then we would talk about what we learned and be like, "Oh, that makes sense now." Like, about why climate change is happening due to our impact . . . We did this as humans, this happened and will impact us as humans. It was just cool to connect the dots and see that is what we were all finding.

The students made sense through "connecting the dots" where they would connect an offered point of sense (one dot) to another sense point, stringing together senses until they had the ah-ha!: "Oh, that makes sense now." Other students reported the "circular" conversations with their peers helped in "wrapping my head around the issue" and "connecting and laying out where the problem was coming from." These dialogic interactions were the primary method students used to make sense of climate change outside of their classes.

Students were more receptive to enact sensemaking with their peers if they shared a similar sense around climate change. In response to a question of the importance in talking to their peers once they have received fearful climate change messages in class, a student said:

> After every class I would walk home with other [CCS] students . . . it was a very emotional time for us to be together. We talked about solutions and what we could do to get involved. These talks felt right because we were all on the same level as far as the information we were getting and the level of knowledge we had . . . and not necessarily ignoring the sad information we had just received, but integrating that into what we needed to know and to remind us about the importance and intensity of climate change.

Students were drawn to make sense with other students at similar levels of sensemaking. It may be that students had greater capacity for sensemaking with one another if their shared sense was similar. Alternatively, perhaps students searched for peers with similar sense simply to discover others with a shared need or desire to make sense of climate change.

Narratives in sensemaking. Sensemaking students used narratives to make sense of the potential for humanity to impact the immensity of climate change. When asked how and why they look for efficacy, a sensemaking student said, "The stories of the students' successes helped me see that taking action isn't meaningless and does have an impact." Stories helped this student select plausible accounts of people actively addressing climate change. Students reported similar thoughts, as one expressed they did not find efficacy in "rationality and objectivity" but instead when their mentors offered narratives of "human potential and connection in cohabitation with the Earth." Sensemaking students sought these narratives not to discover exemplars to emulate, but instead to collect sense that demonstrated the possibilities for addressing climate change.

The Conclusion of Sensemaking

Statements of students enacting sensemaking following their climate change classes were common in the interviews. However, a divergence occurred when students seemed to have already made sense of climate change as they reported it was not beneficial to enact sensemaking processes with their peers. I asked a senior who seemed to have concluded sensemaking around climate change as well as the CCS program whether it was important to talk with their peers about fearful climate change messages. The student stated:

> I would say it's important to discuss the issue with my peers, but I think it gets redundant at some point. You can talk about the problems as much as you want, but eventually you need to come up with solutions. So, while I do think it is healthy to talk to my peers, now I prefer to talk to people who do not accept the science of climate change. I cherish those opportunities because I think it is so healthy to talk to people who don't agree with you.

The student relays a common theme found among those who had concluded sensemaking: the process of sensemaking became unnecessary once students had made a plausible account of climate change. Indeed, other students said that talking with their peers soon became "pointless," "not interesting," or, they "would rather be doing something" about the crisis. Students, then, did not find sensemaking valuable with their peers after a certain point. Instead, students who had concluded sensemaking were primed to address climate change with efficacious actions.

Narratives for efficacy. Once students had made sense of climate change, then efficacy narratives were used to source examples of efficacy they could enact. When asked how and why they seek out efficacy, a student who had concluded sensemaking stated, "When you hear a story of somebody doing something to solve climate change, it's cool, and you can relate to it, but then you want to take the parts of the story and make them your own." The student found stories to be a source to which they could imprint themselves upon. In response to the same question, another student expressed that efficacy narratives can "ground climate change information in a way that's manageable and hopefully useful." This student found stories, at least those most plausible, to offer information they could use to address climate change. Indeed, students who had made sense of climate change looked for narratives where people were successfully mitigating and adapting to change to find actions that they could enact.

Discussion

This study explored how students affectively and cognitively came to terms with the immense threat of climate change outside their initial exposure to climate change fear appeals communicated in their classrooms. They did so through coping via collective efficacy perceptions (affect) and by enacting sensemaking (cognitive) outside their classrooms with their peers. For RQ 1, I found students affectively learned to cope with climate change through gathering collective efficacy perceptions by seeking evidence of collective climate action and engaging in peer validation. For RQ 2, I found students cognitively learned about the immensity of climate change by enacting sensemaking with their peers through dialogic interactions outside the classroom—ultimately serving to neutralize the overwhelming intensity of their fears. Last, for RQ 3, I found students have greater access to both individual and collective efficacy after coming to terms with climate change; once their sensemaking concluded, students tended to no longer wish to enact sensemaking and instead desired to take action to address climate change. These findings suggest coping and sensemaking are crucial for students to come to terms with climate change after instructor-delivered fear appeals to access the efficacy needed to face this planetary threat. Ultimately, this study advances instructional crisis communication by providing insight into student to student out-of-classroom communication and how it affects cognitive and affective learning outcomes concerning climate change.

Students affectively came to terms with climate change by learning to cope. Students learned to affectively cope by gathering collective efficacy perceptions, and did so in two ways: first by seeking evidence of collectivity and second, validation of their fear responses. First, students coped by seeking evidence of a collective will, which aligns with research establishing collective efficacy to be effective at promoting engagement with climate change. Chen (2016) discovered that when individuals are presented with intense fear appeals in climate change communication, their collective efficacy perceptions are more effective at rousing their positive engagement with climate change than their individual efficacy perceptions. Significantly, students located collective efficacy perceptions by perceiving climate change as a comic rather than tragic apocalypse. Foust and O'Shannon Murphy (2009) define the comic frame as one where,

despite our mistakes, humanity can avert the worst of climate change and the tragic frame as one where climate change is an unavoidable fate. Students often oscillated between these two frames during the interviews; however, the students who had come to terms with climate change were more likely to view the crisis as amenable to human intervention rather than an inevitable fate. Overall, collective efficacy is an essential component in climate change fear appeals delivered in instructional crisis communication; not only because collective efficacy provides beliefs that a collective will can mitigate climate change, but because students use collective efficacy perceptions to cope with the climate crisis.

Second, students affectively learned to cope with climate change through seeking and offering validating messages to their peers. Students helped one another to cope by recognizing and accepting their fears around climate change. When the overwhelming intensity of those fears were minimized or rejected, those students tended to become more hopeless, uncertain, and powerless. My findings align with Ojala (2015) who found that youth experience lower efficacy when instructors deny the seriousness of climate change. Validation of one's climate change fears, then, promotes access to efficacy. Students inherently understood that validation promoted efficacy and worked to validate their peers for two reasons. First, to help the peer manage their overwhelming sense of fear. *When peers felt validated by others, their perception of collective efficacy was heightened by their perception of a collective will found in their validators.* Second, to ensure their peers would have the efficacy needed to be a contributing member of the collective will to mitigate climate change, *which furthered the validating student's own collective efficacy perceptions*; in effect, students coped by validating their peer's fears. When validating or being validated, the mechanism that assuaged the students' fears was the perception of collective efficacy.

Students cognitively learned to come to terms with the immense threat of climate change by enacting sensemaking with their peers through dialogic interactions outside the classroom. This interpersonal, ecological sensemaking was triggered by the ambiguity and uncertainty of climate change. Students enacted sensemaking through iterative, circuitous, and processual conversations with peers who shared a similar level of sense surrounding climate change. Through sensemaking, students constructed intersubjective meanings of climate change that enabled action through the now-formed plausible accounts about the potential means one could use to address the crisis despite its immensity, which served to neutralize the overwhelming intensity of their fears. Concurrently, neutralizing the overwhelming intensity of their fears afforded students further access to efficacy. *Coping with the intense fears of climate change allows sensemaking and, in turn, sensemaking neutralizes the overwhelming intensity of those fears.* Indeed, I found cognitively learning to come to terms with climate change is necessary due to the individual's affectively perceived comparative insignificance to the immense scale of the threat. Coming to terms involves an individual affectively and cognitively integrating their comparative insignificance to the immense scale of climate change to attain a holistic, unfragmented sense of the crisis. Significantly, coming to terms with climate change is an arduous learning endeavor that may take *years*.

Students affectively and cognitively learned to come to terms with climate change by their junior or senior year through creating a plausible account of climate change that afforded their access to efficacy. This is not to say they are experts on this complex issue or that they would never need to sensemake again; further sense will be needed as the climate crisis evolves. Rather, the students had reached a "temporary resting [point]" (Sonenshein, 2007, p. 1029) in their sensemaking where they had created a plausible account for the current state of climate change which enabled their action to address the crisis. Meaning, by concluding sensemaking, students had access to the efficacy recommendations taught in their classes. *Students accessed efficacy recommendations given in class not immediately through the*

efficacy message itself but through coming to terms with the threat the efficacy message was designed to address. Before students came to terms with climate change, they used collective efficacy perceptions for coping; however, once students came to terms with climate change, both collective and self-efficacy recommendations did serve to bolster the students' overall efficacy.

In climate change instructional crisis communication, collective efficacy and sensemaking work together to provide affective and cognitive learning outcomes in the climate crisis. In particular, this study extends the instructional and crisis communication literature's focus on self-efficacy—affective in perception and behavioral when enacted—(Frisby et al., 2013; Seeger, 2006; T. Sellnow & Sellnow, 2010) to include collective efficacy, particularly in global environmental crises like climate change. Self-efficacy by itself does not meet the demands of vast crises. Additionally, this study found that sensemaking may be central to cognitively learning about environmental crises that are planetary in scale. While instructional crisis communication scholars find a need for instruction in acute crises to "provide appropriate messages quickly in order to mitigate the rising potential for harm" (T. Sellnow & Sellnow, 2010, p. 118), this study demonstrates that in crescive global environmental crises, instructors should instead foster dialogic interactions to help students make sense of the vast complexity of the crisis situation. In sum, the climate crisis shifts the needs for an instructional crisis communication response.

Practical Applications

While this study focused on learning outcomes outside the classroom, it also informs practical applications for climate change instructional crisis communication in the classroom. First, instructors should support teaching climate change facts with affectively instructing "students how to recognize, be aware of, respond to, value and enact with the world around them" (Thweatt & Wrench, 2015, p. 501). In particular, instructors should focus on how students can engage with large-scale efforts to address climate change to help students affectively learn to "acquire a collective sense of competence" (Chawla & Cushing, 2007, p. 446). Second, cognitive learning outcomes can be developed in class through fostering dialogic discussion among students. Innes (2007) finds in his study a low instance of high-quality classroom discussions. Therefore, Innes (2007) proposes that instructors model classroom discussion through their example and for students "to develop demonstrations of good dialogic discourse and present them before the class" (p. 16). In doing so, students will have greater opportunities to access the sensemaking that leads to cognitive learning outcomes. Last, regarding efficacy as a behavioral learning outcome, instructors using classroom fear appeals should "modify their messages to enhance learning and efficacy" (Frisby et al., 2013, p. 254). In particular, when designing efficacy messages, instructors should present "high efficacy solutions so that the messages can achieve the best persuasive outcomes" (Li, 2014, p. 255). Modifying fear appeals to meet a class's shifting needs will be a highly applicable skill. Following these practical applications in class will increase the effectiveness of instruction to achieve learning outcomes within the climate crisis.

Limitations

Despite reaching theoretical data saturation (Saunders et al., 2018), the 19 students studied across 12 interviews and two focus groups of seven participants total may represent a limitation in qualitative research design due to the sample size. For interviews, qualitative researchers and evaluators recommend either 12 (Guest et al., 2006) or 13 (Francis et al., 2010) interviews to reach data saturation. The interview sampling in this study, then, is largely consistent with these findings. To attain data saturation for

focus groups, a sample size of either three (Guest et al., 2017) or three to five (Namey et al., 2016) are recommended. Therefore, I may have needed a higher sample size in the focus groups to reach an adequate measure of data saturation. Yet, Hagaman and Wutich (2017) find the number of interviews needed to attain data saturation may depend upon the research design and questions. Extending this insight to the integration of interviews and focus groups (Lambert & Loiselle, 2008), I found the data saturation first garnered from the 12 interviews aided in later reaching data saturation from the two focus groups. Regardless, data saturation is not the only marker of quality when conducting qualitative research. As Sebele-Mpofu (2020) concludes, other important measures exist, including "credibility, diversity, conformability, trustworthiness and reliability" (p. 15). In retrospect, more focus groups were needed to meet these measures.

Conclusion

When I recall the wildlife biology professor's lecture and his deliberate use of climate change fear appeals, I am not sure if he truly understood what students were effecting when they conversed with one another outside of class. However, over time, I think he saw the results of those conversations. Given my intense exploration into the matter culminating in this research, I find myself questioning if his use of fear appeals benefited the students. The answer, I discover, is complicated. Yes, his deliberate use of climate change fear appeals impelled the students to engage in peer dialogue. However, the CCS minor was designed around students encountering climate change in the context of a supportive community. Thus, I am concerned the effectivity of his fear appeals was found more in the community than the messages themselves. I recommend instructors take into consideration their students' capacities for coping and enacting sensemaking with their peers before deliberately using climate change fear appeals. Instructors should emphasize the fear immanent to climate change only if measures are taken in class to establish the affective and cognitive learning necessary for students to cope and sensemake outside of class. Ultimately, climate change instructional crisis communication is effective when instructors approach affective and cognitive learning with care and respect. Then, instructors can teach students how to efficaciously enact their behavioral learning while confronted with this planetary threat.

References

Armstrong, A. K., Krasny, M. E., & Schuldt, J. P. (2018). *Communicating climate change: A guide for educators*. Cornell University Press. http://www.jstor.org/stable/10.7591/j.ctv941wjn

Bandura, A. (1999). *Self-efficacy: The exercise of control*. Freeman.

Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science, 9*(3), 75–78. https://doi.org/10.1111/1467-8721.00064

Beamish, T. D. (2002). *Silent spill: The organization of an industrial crisis*. MIT Press.

Bloom, B. S. (1956). *Taxonomy of educational objectives: Handbook I: Cognitive domain*. McKay.

Catino, M., & Patriotta, G. (2013). Learning from errors: Cognition, emotions and safety culture in the Italian Air Force. *Organization Studies, 34*(4), 437–467. https://doi.org/10.1177/0170840612467156

Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental Education Research, 13*(4), 437–452. https://doi.org/10.1080/13504620701581539

Chen, M. F. (2016). Impact of fear appeals on pro-environmental behavior and crucial determinants. *International Journal of Advertising, 35*(1), 74–92. https://doi.org/10.1080/02650487.2015.1101908

Coombs, T. W. (2009). Conceptualizing crisis communication. In R. L. Heath & H. D. O'Hair (Eds.), *Handbook of risk and crisis communication* (pp. 99–118). Taylor & Francis Group. https://doi.org/10.4324/9781003070726

Cunsolo, A., & Ellis, N. R. (2018). Ecological grief as a mental health response to climate change-related loss. *Nature Climate Change, 8*(4), 275–281. https://doi.org/10.1038/s41558-018-0092-2

Feldman, L., & Hart, P. S. (2016). Using political efficacy messages to increase climate activism. *Science Communication, 38*(1), 99–127. https://doi.org/10.1177/1075547015617941

Fernández-Ballesteros, R., Díez-Nicolás, J., Caprara, G. V., Barbaranelli, C., & Bandura, A. (2002). Determinants and structural relation of personal efficacy to collective efficacy. *Applied Psychology, 51*(1), 107–125. https://doi.org/10.1111/1464-0597.00081

Foust, C. R., & O'Shannon Murphy, W. (2009). Revealing and reframing apocalyptic tragedy in global warming discourse. *Environmental Communication, 3*(2), 151–167. https://doi.org/10.1080/17524030902916624

Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology & Health, 25*(10), 1229–1245. https://doi.org/10.1080/08870440903194015

Frisby, B. N., Sellnow, D. D., Lane, D. R., Veil, S. R., & Sellnow, T. L. (2013). Instruction in crisis situations: Targeting learning preferences and self-efficacy. *Risk Management, 15*(4), 250–271. https://doi.org/10.1057/rm.2013.7

Gephart Jr, R. P. (2007). Crisis sensemaking and the public inquiry. In C. M. Pearson, C. Roux-Dufort, & J. Clair (Eds.), *International handbook of organizational crisis management*. Sage Publications.

Gephart, R. P., Topal, C., & Zhang, Z. (2010). Future-oriented sensemaking: Temporalities and institutional legitimation. In T. Hernes & S. Maitlis (Eds.), *Process, sensemaking, and organizing* (pp. 275–312). Oxford University Press.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59–82. https://doi.org/10.1177/1525822x05279903

Guest, G., Namey, E., & McKenna, K. (2017). How many focus groups are enough? Building an evidence base for nonprobability sample sizes. *Field Methods, 29*(1), 3–22. https://doi.org/10.1177/1525822x16639015

Hagaman, A. K., & Wutich, A. (2017). How many interviews are enough to identify metathemes in multisited and cross-cultural research? Another perspective on Guest, Bunce, and Johnson's (2006) landmark study. *Field Methods, 29*(1), 23–41. https://doi.org/10.1177/1525822x16640447

Hauenstein, A. D. (1998). *A conceptual framework for educational objectives: A holistic approach to traditional taxonomies*. University Press of America.

Homburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology, 26*(1), 1–14. https://doi.org/10.1016/j.jenvp.2006.03.003

Hulland, C., & Munby, H. (1994). Science, stories, and sense-making: A comparison of qualitative data from a wetlands unit. *Science Education, 78*(2), 117–136. https://doi.org/10.1002/sce.3730780202

Innes, R. B. (2007). Dialogic communication in collaborative problem solving groups. *International Journal for the Scholarship of Teaching and Learning, 1*(1), 1–19. https://doi.org/10.20429/ijsotl.2007.010104

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

Kuntzman, L. E., & Drake, J. L. (2016). Introduction: An overview of crisis communication. In J. L. Drake, Y. Y. Kontar, J. C. Eichelberger, T. S. Rupp, & K. M. Taylor (Eds.), *Communicating climate-change and natural hazard risk and cultivating resilience: Case studies for a multi-disciplinary approach*. Springer.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*. Sage.

Lambert, S. D., & Loiselle, C. G. (2008). Combining individual interviews and focus groups to enhance data richness. *Journal of Advanced Nursing, 62*(2), 228–237. https://doi.org/10.1111/j.1365-2648.2007.04559.x

Li, S. C. S. (2014). Fear appeals and college students' attitudes and behavioral intentions toward global warming. *The Journal of Environmental Education, 45*(4), 243–257. https://doi.org/10.1080/00958964.2014.930399

Li, S. C. S., & Huang, L. M. S. (2020). Fear appeals, information processing, and behavioral intentions toward climate change. *Asian Journal of Communication, 30*(3–4), 242–260. https://doi.org/10.1080/01292986.2020.1784967

Maitlis, S. (2005). The social processes of organizational sensemaking. *Academy of Management Journal, 48*(1), 21–49. https://doi.org/10.5465/amj.2005.15993111

Maitlis, S., & Christianson, M. (2014). Sensemaking in organizations: Taking stock and moving forward. *The Academy of Management Annals, 8.* https://doi.org/10.1080/19416520.2014.873177

Malphurs, R. (2012). *Rhetoric and discourse in Supreme Court oral arguments: Sensemaking in judicial decisions* (1st ed.). Routledge. https://doi-org.ezp1.lib.umn.edu/10.4324/9780203082942

Moser, S. C. (2010). Communicating climate change: History, challenges, process and future directions. *Wiley Interdisciplinary Reviews: Climate Change, 1*(1), 31–53. https://doi.org/10.1002/wcc.11

Myers, S. A. (2017). Instructional communication. In M. Allen (Ed.), *The SAGE encyclopedia of communication research methods*. SAGE Publications, Inc. https://doi.org/10.4135/9781483381411

Namey, E., Guest, G., McKenna, K., & Chen, M. (2016). Evaluating bang for the buck: A cost-effectiveness comparison between individual interviews and focus groups based on thematic saturation levels. *American Journal of Evaluation, 37*(3), 425–440. https://doi.org/10.1177/1098214016630406

Ojala, M. (2015). Hope in the face of climate change: Associations with environmental engagement and student perceptions of teachers' emotion communication style and future orientation. *The Journal of Environmental Education, 46*(3), 133–148. https://doi.org/10.1080/00958964.2015.1021662

O'Neill, S., & Nicholson-Cole, S. (2009). "Fear won't do it": Promoting positive engagement with climate change through visual and iconic representations. *Science Communication, 30*(3), 355–379. https://doi.org/10.1177/1075547008329201

Owens, D. C., Sadler, T. D., & Zeidler, D. L. (2017). Controversial issues in the science classroom. *Phi Delta Kappan, 99*(4), 45–49. https://doi.org/10.1177/0031721717745544

Reser, J. P., & Bradley, G. L. (2017). Fear appeals in climate change communication. *Oxford University Press*. https://doi.org/10.1093/acrefore/9780190228620.013.386

Ruiter, R. A. C., Abraham, C., & Kok, G. (2001). Scary warnings and rational precautions: A review of the psychology of fear appeals. *Psychology & Health, 16*(6), 613–630. https://doi.org/10.1080/08870440108405863

Saldaña, J. (2009). *The coding manual for qualitative researchers*. Sage.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity, 52*(4), 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

Schreiner, C., Henriksen, E. K., & Kirkeby Hansen, P. J. (2005). Climate education: Empowering today's youth to meet tomorrow's challenges. *Studies in Science Education, 41*(1), 3–49. https://doi.org/10.1080/03057260508560213

Sebele-Mpofu, F. Y. (2020). Saturation controversy in qualitative research: Complexities and underlying assumptions. A literature review. *Cogent Social Sciences, 6*(1), 1–17. https://doi.org/10.1080/2331188 6.2020.1838706

Seeger, M. W. (2006). Best practices in crisis communication: An expert panel process. *Journal of Applied Communication Research, 34*(3), 232–244. https://doi.org/10.1080/00909880600769944

Sellnow, D. D., Lane, D. R., Sellnow, T. L., & Littlefield, R. S. (2017). The IDEA model as a best practice for effective instructional risk and crisis communication. *Communication Studies, 68*(5), 552–567. https://doi.org/10.1080/10510974.2017.1375535

Sellnow, D. D., Limperos, A., Frisby, B. N., Sellnow, T. L., Spence, P. R., & Downs, E. (2015). Expanding the scope of instructional communication research: Looking beyond classroom contexts. *Communication Studies, 66*(4), 417–432. https://doi.org/10.1080/10510974.2015.1057750

Sellnow, T., & Sellnow, D. (2010). The instructional dynamic of risk and crisis communication: Distinguishing instructional messages from dialogue. *Review of Communication, 10*(2), 112–126. https://doi.org/10.1080/15358590903402200

Sellnow, T. L., Sellnow, D. D., Lane, D. R., & Littlefield, R. S. (2012). The value of instructional communication in crisis situations: Restoring order to chaos. *Risk Analysis, 32*(4), 633–643. https://doi.org/10.1111/j.1539-6924.2011.01634.x

Skurka, C., Niederdeppe, J., Romero-Canyas, R., & Acup, D. (2018). Pathways of influence in emotional appeals: Benefits and tradeoffs of using fear or humor to promote climate change-related intentions and risk perceptions. *Journal of Communication, 68*(1), 169–193. https://doi.org/10.1093/joc/jqx008

Sonenshein, S. (2007). The role of construction, intuition, and justification in responding to ethical issues at work: The sensemaking-intuition model. *Academy of Management Review, 32*(4), 1022–1040. https://doi.org/10.5465/amr.2007.26585677

Thweatt, K. S., & Wrench, J. S. (2015). Affective learning: Evolving from values and planned behaviors to internalization and pervasive behavioral change. *Communication Education, 64*(4), 497–499. https://doi.org/10.1080/03634523.2015.1058964

Tracy, S. J. (2013). *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. John Wiley & Sons.

Ulmer, R. R. (2015). *Effective crisis communication: Moving from crisis to opportunity* (Third ed.). SAGE.

Verlie, B. (2019). Bearing worlds: Learning to live-with climate change. *Environmental Education Research, 25*(5), 751–766. https://doi.org/10.1080/13504622.2019.1637823

Waldeck, J., Plax, T. G., & Kearney, P. (2010). Philosophical and methodological foundations of instructional communication. In D. L. Fassett & J. T. Warren (Eds.), *The SAGE handbook of communication and instruction* (pp. 161–179). Sage.

Weick, K. E. (1988). Enacted sensemaking in crisis situations. *Journal of Management Studies, 25*(4), 305–317. https://doi.org/10.1111/j.1467-6486.1988.tb00039.x

Weick, K. E. (1995). *Sensemaking in organizations*. Sage.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science, 16*(4), 409–421. https://doi.org/10.1287/orsc.1050.0133

Whiteman, G., & Cooper, W. H. (2011). Ecological sensemaking. *Academy of Management Journal, 54*(5), 889–911. https://doi.org/10.5465/amj.2008.0843

Wrzesniewski, A., Dutton, J. E., & Debebe, G. (2003). Interpersonal sensemaking and the meaning of work. *Research in Organizational Behavior, 25*, 93–135. https://doi.org/10.1016/S0191-3085(03)25003-6