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Understanding "Death": Creating Student Opportunities for Meaningful Emotional Expression in the Science Classroom

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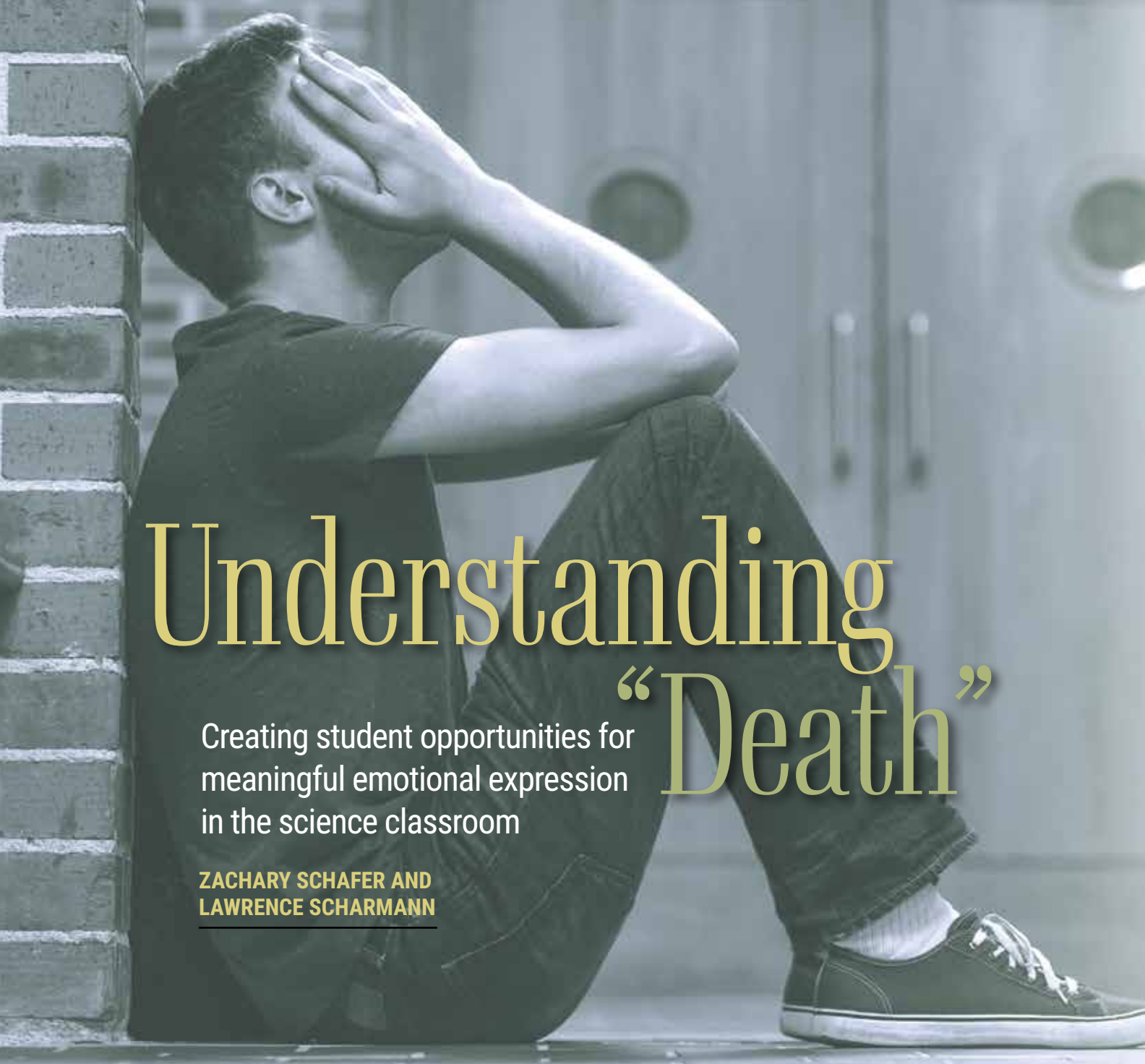

Understanding "Death"

Creating student opportunities for meaningful emotional expression in the science classroom

ZACHARY SCHAFER AND
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Mental health is a topic often avoided by science teachers (Chen and Techawitthayachinda 2021). Uncertainty drives the avoidance of mental health with the fear that its unveiling may cause psychological or emotional harm (Oliveira et al. 2014). These fears sound like, "I won't know what to say," and "I don't have the expertise." Avoiding these uncertainties may compound teacher fears by suppressing student affect and deepening emotional scars (Kelly and Thorsborne 2014); it's really hard to do science if your mind is dealing with more pressing personal matters.

Death as a common mental health issue, however, can be viewed through a lens of student well-being, which can be nurtured through the use of a simple triad—maximize positive affect, minimize negative affect, and minimize the inhibition of affect (Watchtel 2016). Teachers often fear that difficult topics may maximize negative affect. Counterintuitive to the notion, this assumption may actually cause disequilibrium to well-being by inhibiting affect and the expression of present student challenges (Compare et al. 2014; Kelly and Thorsborne 2014).

Understanding death as natural and integral to life cycles has been considered crucial and relevant in science teaching (NRC 1996; NRC 2012). The concept of death not only defines the physical end of life but also the end of a cycle and the beginnings of transformation. Adopting a broader definition of death thus empowers educators to directly address the affect and emotion that occurs for all students.

This article explores death and disease through personal experience grounded in science core content, understood through skills

necessary for scientific literacy and facilitated through skills taken from restorative practices and humanist perspectives in psychology (Kelly and Thorsborne 2014; Levine and Levine 1998; Pearson and Wilson 2009; Rogers 1951). The lesson presented constructs a model that "describes that all organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death" (NGSS 2013, 3-LS1). The personal experience is then analyzed and expanded upon. The following lesson and personal story were used to provide students opportunities to reflect, express, and start a journey to deeper understanding.

Cell biology, cancer, and what to do with anomalies

After returning to school from an anomalous leave on the previous Friday, I centered my students' attention on data points I put on the board (Figure 1). The dots sat static across ambiguous numbered axes. I posed to my students, "What do you observe?"

Students shared their observations. When someone noticed the outlier, I continued with the following, "There are three ways to deal with outliers. We can lie, we can split, or we can lump." The liars pretend the event doesn't occur; nothing productive can follow. The splitters acknowledge the outlier, but choose to focus on the larger grouping. The lumpers include all the data and start asking questions.

I asked students what they remembered about cell biology and facilitated the construction of a model that described cell development, division, and death (NGSS 2013, 3-LS1). We discussed what can happen when the cell cycle is altered. Together, the model and discussion led to the phenomenon of cancer. My students knew how cancers develop. My students knew cancers differ, some more rare than others. To this effect, I described one of the rarest:

> There is a rare type of brain cancer called Glioblastoma multiforme. This cancer is caused by a random genetic mutation. The odds of the mutation are rare. There are100 trillion cells in the body. During the life of the cell, it will divide around 50 times. Each time the cell divides it must copy its DNA. The DNA in each cell is made of about 240 billion base pairs. Ninety-five percent of our DNA codes for nothing. The other 5% has 30,000–50,000 genes, each of which codes for varied specific proteins which allows each individual cell in the body to properly function. However, sometimes cells make mistakes when copying DNA. If a mistake is made and it causes the cell to grow and divide at a faster rate than normal, then a mass is created. This is cancer. In 1 of 100 trillion cells, on 5% of the DNA, on 1 of 30,000 to 50,000 possible genes, 1 to 4 of the 240 billion base pairs were changed at a critical locus in order to cause a rapidly growing brain cancer. Surgical excision is difficult and sometimes impossible. This cancer is an outlier, occurring in only 2 to 3 of every 100,000 adult cancers (American Association of Neurological Surgeons 2021). My brother has Glioblastoma multiforme.

The air in the room shifted. At this point, I labeled the axes of the graph and circled the outlier (Figure 2). I said, "As a scientist, I see this event in my life in the context of data. This type of event is an outlier compared to daily life…so, I can lie, split, or lump. I can pretend it's not true. I can focus on what is in the here and now. I can try to understand what is happening. Or, I can do a combination of the three."

> The distance between what we currently understand and what we don't yet understand is nothing more than a series of "why" and "how" questions—the questions of science. While none of us may fully answer the biggest "why" questions, we can begin to understand an event using science as a lens to gain new insights. The ability to bridge the gap between current understanding and what we don't know, whether it be in a lab or in life, allows us to embrace uncertainty, diminish fear, and engage with the world.

FIGURE 1

Unlabeled graph as shown to students.

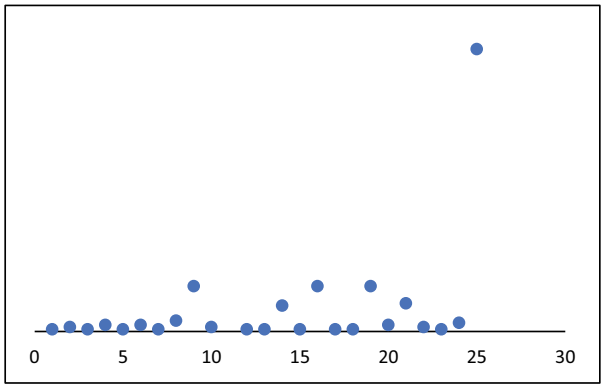
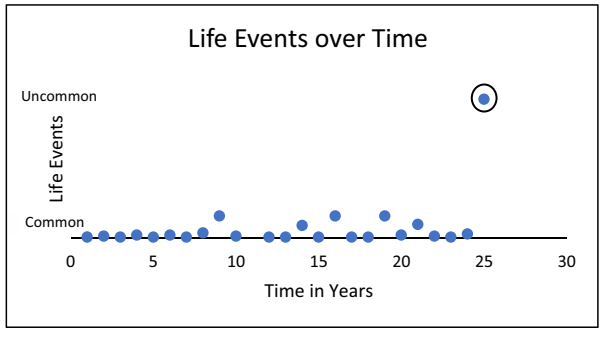


FIGURE 2

Graph with labels added.



Working toward understanding acknowledges the outlier. In this case, it acknowledges my brother and all of who he is. When I acknowledge him, I am given the chance to think about how he has impacted me positively, and in turn, positively impact others. Choosing to acknowledge and embrace life's challenges through science gives us the power to gain new perspectives. It is an opportunity to be more whole as people by adopting the lessons the world has to teach us and using those lessons to be better people.

With 10 minutes left in class, I offered my students the opportunity to write about the challenges in their lives with the understanding that it would not need to be shared—as suggested by Scharmann (2018)—unless they wanted it to be (Pearson and Wilson 2009). In a rare occurrence, my students sat in quiet reserve, each writing in their notebooks. When the bell rang, one student approached me with condolences and a piece of paper. On the piece of paper, was a list of people he had lost in his life. He spoke about how difficult it had been to deal with these challenges. He then thanked me for the lesson I had given, noting, "It was a lesson that I needed." This lesson, if nothing else, led to stronger student-teacher relationships, provided an opportunity for some students to get additional help, allowed them to learn science, and did so by approaching student well-being through thoughtful expression of affect and emotion (Compare et al. 2014; Kelly and Thoresborn 2014; Quinlan 2016).

Part of the fear of vulnerability is not knowing what to do or say. It is important to know that you can't fix or remove student problems. Compassion, nonetheless, can be sincerely expressed.

Underlying principles for adaptation and modification

The lesson related above has its roots in Restorative Practices, the first two values of which are respect and relationship (Watchtel 2016). A teacher looking to provide opportunities that minimize the inhibition of affect, must have built respect and strong teacher-student relationships. These values are the foundation of trust. Trust is required for authentic connection (Pearson and Wilson 2009) and appropriate vulnerability is the vehicle that gets the teacher from A to B.

Appropriate vulnerability

Being vulnerable at its base level, means sharing personal information. Vulnerability activates the "care system" within people, which opens people up and leads to reciprocal vulnerability (Dijker 2014). This knowledge should be carefully managed. Vulnerability is about sharing to the degree to which you feel your audience can effectively connect (Brown 2013). Vulnerability and its derivatives can be managed in the following ways:

- **Frame It:** A frame is instrumental in helping students to process information (Sweller 2011). The "Liars, Splitters, and Lumpers" frame gave students concrete categories through which to filter their thoughts.
- **Keep It Close:** The lesson should be tightly woven into science content and practices. Core content was used to understand the information from an objective standpoint and the practices were used as a tool for personal reflection. Keeping it close further reinforces the frame and places appropriate boundaries around the expression of challenging topics.
- **Be Comfortable With Your Story:** Tell a story you know well and one that you can appropriately modify. My experiences with prior grief allowed me to relate an authentic story that was emotionally under control and appropriate for my audience.
- **Invite, Do Not Demand:** Students need the opportunity to express themselves in non-threatening ways (Scharmann 2018) through creative mediums that can act as conduits for personal thoughts (Levine and Levine 1998). Students should then be left with the choice to participate in expression or not, what to write/draw/etc., and who to share with (Pearson and Wilson 2009).
- **Listen and Reflect:** Part of the fear of vulnerability is not knowing what to do or say. It is important to know that you can't fix or remove student problems. Compassion, nonetheless, can be sincerely expressed. If students share,

be open to listening and reflecting their emotions (Rogers 1951). Do so with phrases like, "That must be challenging," and always end the student's sharing of vulnerability with "Thank you for sharing that with me." Reward students for their bravery instead of evaluating their story.

- **Know Your Resources:** Tell students when you have concerns beyond your training. Direct them to the individuals at school who can extend the conversation in productive ways.

Discussion

It's frightening to open the door to student concerns and questions that we may not possess expertise to handle. Though, giving students a chance to use science to mobilize their fears through the emotion of discovery and personal expression is important. While it can be unsettling, it is important to realize that this isn't a "one-size fits all" method (Pearson and Wilson 2009). By considering the factors in this article, you can create your own model by asking questions like, "How can I appropriately be more vulnerable?" and "How can I provide opportunities for my students to express themselves in a way that is non-threatening?"

Attention to student affect can give students an opportunity to achieve an initial understanding of abstract and difficult topics through metacognition (Anderson and Krathwohl 2001) and the exploration of personal, meaningful aspects of life. Through the use of a well-structured frame of analysis that is explored in a way that is non-threatening (Scharmann 2018), the science teacher can approach scientific literacy in a way that emotionally binds and develops students' relationships with the discipline and the teacher (Quinlan 2016).

As teachers, our mission is to teach science. As educators our mission is to cultivate lifelong learners and individuals who are competent, autonomous, and who can relate to each other and the world (Adams et al. 2017). Death is a natural part of life and is a topic that our students will experience as they grow. Death is an uncertainty to embrace, not avoid. One way to consider how we might start to merge the mission of the science teacher with their more holistic self is to create lessons that approach difficult topics through the lens of science. Speaking together means growing together.

As I sat and waited to hear if my brother will make it through his brain surgery, one of his daughters called my name. She said, "What's your favorite color?" I said, "Orange." Within a minute or so she emerged from her hiding spot with a pipe-cleaner twisted into the shape of a bracelet. I gladly accepted. She went from person to person, asking them the same question she asked me, and making for them, the same, simply tied, pipe-cleaner bracelet.

As I looked around, I noticed that everyone was a little more talkative—smiling and joking. Then, silence fell on the air. Silently, each of our hearts welled and gave everyone the chance to expel a little anguish.

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