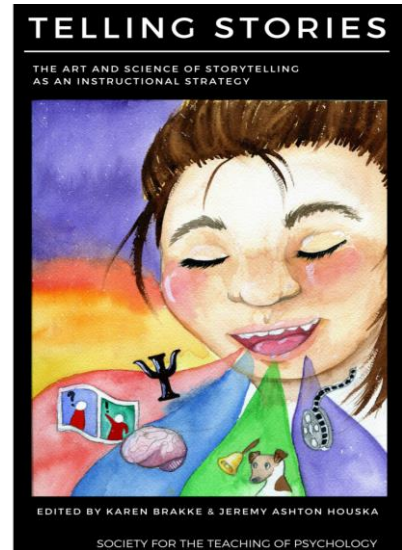


Antsy Students Impatient to Leave Class & Faculty Captive in NPR Driveway Moments? Enhancing Science Classes with Personal Stories

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Abstract:

Storytelling aids student memory and learning. Instructors self-disclose personal stories and this helps students feel connected to their teachers and the subject. Storytelling and self-disclosure increase students' perceptions of their affective, behavioral, and cognitive learning. It helps students engage more in class and use class concepts. Personal storytelling also improves students' perceptions of the teacher's credibility and leads to higher course evaluations. Many examples provided illustrate the use of personal storytelling during class. In the present study 174 students answered 182 multiple choice test items in an Introductory Psychology class. The topics of most test items were covered in class in one of five pedagogical uses of stories, or in a control condition (i.e., no story on topic). A story by attendance interaction revealed that while class attendance always helps students perform better, when the topics were taught with a story, the students who were in attendance were especially likely to benefit, $F(6,167)=10.479, p<.005$.

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Antsy Students Impatient to Leave Class & Faculty Captive in NPR Driveway Moments? Enhancing Science Classes with Personal Stories

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We often use **counterfactual reasoning** by thinking about what *might, could or should* have been. We let these thoughts of the past or future bias our judgments. For example, in one oft-cited study, a boss orders lunch with a wine sauce that causes an allergic reaction in his employee, sending her into convulsions. She dies on the way to the hospital. How guilty do we judge the boss? If the alternative menu item he had considered ordering did not have the wine sauce, he is judged as a greater cause of her death than if the alternative would have had the same wine sauce, and presumably the same dire consequence (Wells & Gavanski, 1989).

Please let me start this chapter again.

You wouldn't believe how many concerns and decisions there are when you're expecting. With our daughter, Abigail, we learned about storing umbilical cord blood because it has special cells that might be useful for medical treatments someday. Should we? Like good social scientists, well versed in statistics, we pondered. What is the probability cord blood would ever be used? What is the probability other treatments will be available? What is the effect size of an alternative use of that expense that could benefit Abigail? There were just so many unknowns about this somewhat expensive possibility that seemed a little like a gimmick. We just couldn't decide. So then, diagnosed with mild "polyhydramnios" - too much amniotic fluid. What does that mean? Like good social scientists we researched it. Though 1% of pregnancies have poly-hydra-whatever, 75% of cerebral palsy births do. Then we find a single case study on the internet: a newborn with cerebral palsy was successfully treated with cord blood. Did we look for detailed scientific evidence? No! We are going to store that cord blood! Because WHAT IF Abigail is born with cerebral palsy and we COULD HAVE saved the cord blood, but we didn't, and we COULD HAVE tried a treatment that MIGHT work, and it just wouldn't be available to us? That would be horrific!! Obviously we stored the cord blood! Despite all our education in statistical thinking and our awareness that a single case study is not the same as an empirical study, it just didn't matter. What mattered was some sort of more deeply ingrained way of thinking - the "what if," "might be" or, "could be" thoughts that psychologists who study social cognition call, "**counterfactual reasoning**." ...

When I teach counterfactual reasoning, I begin with this personal anecdote and then continue with a formal definition and several slides describing classic studies. Should I share this personal story? After all, it 'costs' about 2 minutes of precious little class time, when I could present yet another study. Dozens of times each semester I make the same choice – mostly personal stories, but also those shared by famous figures in the field about their discoveries, historical examples, and other compelling stories. Stories work. We see stories working in NPR's journalism when it keeps us in the driveway learning about a topic we didn't know we cared about when we began driving home. We see it in the popularity of TED talks that are "ideas worth spreading." The same ideas are commonplace in classrooms, but they're "worth spreading" because, as TEDx founder Lara Stein

elucidates, “it’s about simplified, authentic storytelling.”¹ We might compare a standard definition of the Law of Conservation of Energy that every bored high school physics student memorizes - “Energy is neither created nor destroyed; it merely changes form.” – with how Feynman, a physicist famous for his lectures once described it:

The world looks so different after learning science. For example, trees are made of air, primarily. When they are burned, they go back to air, and in the flaming heat is released the flaming heat of the sun which was bound in to convert the air into tree, and in the ash is the small remnant of the part which did not come from air that came from the solid earth, instead. These are beautiful things, and the content of science is wonderfully full of them. They are very inspiring, and they can be used to inspire others (Feynman, 1969).

For most people, examples like these and the intuition that we feel from others’ responses to our personal storytelling would be enough to convince us of its value. I have told stories in class since I began teaching, even though I had never read an empirical study of its value. Even so, the value of personal storytelling is consistent with research throughout psychology. Cognitive psychology suggests that attention increases learning (e.g., Sana, Weston, & Cepeda, 2013). Processing concepts by considering their personal relevance (self-schema) leads to better recall on a “pop quiz” than even if we intentionally tried to memorize the concepts (e.g., Hyde & Jenkins, 1969). Developmental psychology suggests our need for intersubjectivity, a deeper, more genuine connection with others (e.g., Tomasello & Carpenter, 2005), and sharing personal stories in class feels more like everyday conversation than lecture. Social psychology suggests that we build intimacy toward communal relationships through self-disclosure (e.g., Altman & Taylor, 1973). We’re more intrinsically motivated to work with someone in a communal relationship (e.g., Clark, Mills, & Powell, 1986) and students’ intrinsic motivation helps them learn deeply and be creative (e.g., Amabile, 1985). Despite the many tangential findings suggesting the value of storytelling, teachers of science might be most convinced with direct empirical evidence.

Before returning to the overarching value of personal storytelling for class and the potential ethical dilemma for a science teacher who constantly shares anecdotes, let’s examine empirical evidence specifically relevant to personal storytelling. First, how typical is it for instructors to share stories and build personal connections with students? Second, how do narratives affect memory and learning? Third, might personal stories be unique? Fourth, how does personal storytelling affect students’ motivation and emotion? Fifth, how does personal storytelling affect students’ behavior in and out of the classroom? Finally, how does personal storytelling affect students’ perceptions of their instructors?

Do Instructors Share Personal Stories in Class?

Teachers regularly share of themselves with their students and they do so with clear purpose. Downs, Javidi, and Nussbaum (1988) audio-recorded the classes of 57 college instructors. During a typical 90-minute college class, instructors made 18 narrative statements (60% non-fiction) and shared 5 personal stories (100% either clarified class concepts or encouraged participation), and 18.5 self-disclosures. The instructors attempted humor 24 times, including four times when they were humorous about themselves. Hosek and Thompson (2009) surveyed 41 college teachers from

¹ <http://www.tedxvenlo.com/news/nieuws/the-ted-philosophy-according-to-a-failed-farmer/>

diverse universities, fields, and ethnicities about the strategies they used when deciding what to disclose to students. Teachers considered self-disclosure if it was beneficially relevant to class. They refrained from self-disclosure if they considered the risks unwarranted (e.g., stigmatization, credibility with students, making someone uncomfortable, or harming relationships with colleagues). McBride and Wahl (2005) had 15 college instructors from six universities and diverse fields record a total of 121 daily diary entries about their self-disclosures in class. The most common self-disclosures were about family, personal attitudes, outside-class activities, and personal histories. By far the most common reason instructors gave for self-disclosures was to serve as examples or extensions of course content (41%); the next most common reason was to relate to students (19%). Instructors purposely avoided self-disclosures about negative personal relationships, sexual activities, and anything that put themselves or their families in a bad light.

That instructors purposely avoid certain self-disclosure does not necessarily mean those self-disclosures would actually be harmful. In the summer of 1995 in the deep South, Liddle (1997) considered the risks versus benefits of coming out as a lesbian woman to her classes. National Gallup polls of the time showed 52% of Americans considered homosexuality an “unacceptable” lifestyle and 47% believed homosexual relations between consenting adults should be illegal. When separating data by region, the South had the most negative attitudes toward lesbian women and gay men.² Liddle felt it might benefit society to come out, but that it also might be a risk to her instructor evaluations. Prior to coming out, she conducted mid-semester evaluations using the identical form as the official end-of-semester evaluations (allowing for pre- & post-test). She came out to two of four sections of class during a subsequent relevant course segment. There was no significant difference in evaluations due to self-disclosure. In fact, the means leaned toward self-disclosure improving her evaluations.

Teachers strategically share personal stories with goals beyond illustrating course concepts. Relating to students includes examples such as an instructor who helped her students overcome anxiety about giving class presentations by revealing that she still gets nervous before presenting at conferences (an example from McBride & Wahl, 2005). Our stories might also help students understand class policies and teaching style, but helping students appreciate class from our perspectives. Rather than “teaching to the middle,” I teach just intensely enough where even the most successful students sometimes miss things. My tests challenge students with applications and connections we have not explicitly made in class. Raw scores are low, but I scale so that “excellent” students still earn A’s. I point out the Pygmalion Effect (Rosenthal & Jacobson, 1968) and how much I learned through the overwhelming tests that were the norm for undergraduate Physics classes. But I also share a more poignant lesson for me:

As an undergraduate Physics major I took computer science, and it was a breeze. I was at the top of the class because I’d taught myself, as I needed to for Physics. So then I went to grad school in Logic & the Philosophy of Math & Science. Logic is the foundation of computer science so we were required, as grad students, to take 100-level computer science classes - just several philosophy grad students and 200 freshmen. But this was Carnegie Mellon University, who regularly competes with MIT to be the world-renowned Computer Science school. So I’m not surrounded by just any 200 freshmen. These are 200 freshmen who’ve been computer programming since they were in diapers (probably) and these classes are really meant to weed out those who can’t cut it in the major. This course was IMPOSSIBLE! Freshmen would come into the labs hours after I’d begun my homework, program in 15 minutes, and they’d leave hours before me. I spent more time

² <http://www.gallup.com>

on that class than all my grad-level classes COMBINED! It actually wasn't impossible, though by the end of the term I was the only philosophy grad student who hadn't dropped. And I did squeak by with a B. My computer programming ability was qualitatively leaps beyond where I began. But why? I took computer science as an undergrad. Maybe my undergraduate professor wouldn't expect everyone to program like CMU CS majors. But why weren't we at least exposed to the advanced ideas so we'd have the option to struggle ourselves to understand more deeply? Maybe he didn't believe in us. But I believe in you. I don't care that we're not at the most elite university, I will still teach you as intensely as I can. You can certainly earn an A by being conscientious, but I hope you'll consider pushing yourself further. And I'll help you.

My first semester as an assistant professor, I had not shared this story, taking the way that undergraduate physics classes worked as the way any undergraduate science classes must work. It turns out I was incorrect. My second semester, I added the aforementioned personal story and a short tutorial on how to prepare for tests. I did not alter my level of teaching or the rigor of tests. My evaluations on grade-related items improved 86% more than my improvement on other items (see figure 1). I've made a connection to students with my story; they can identify with me, and even if they hate some aspects of my pedagogy, they know my practices are motivated by empathy.

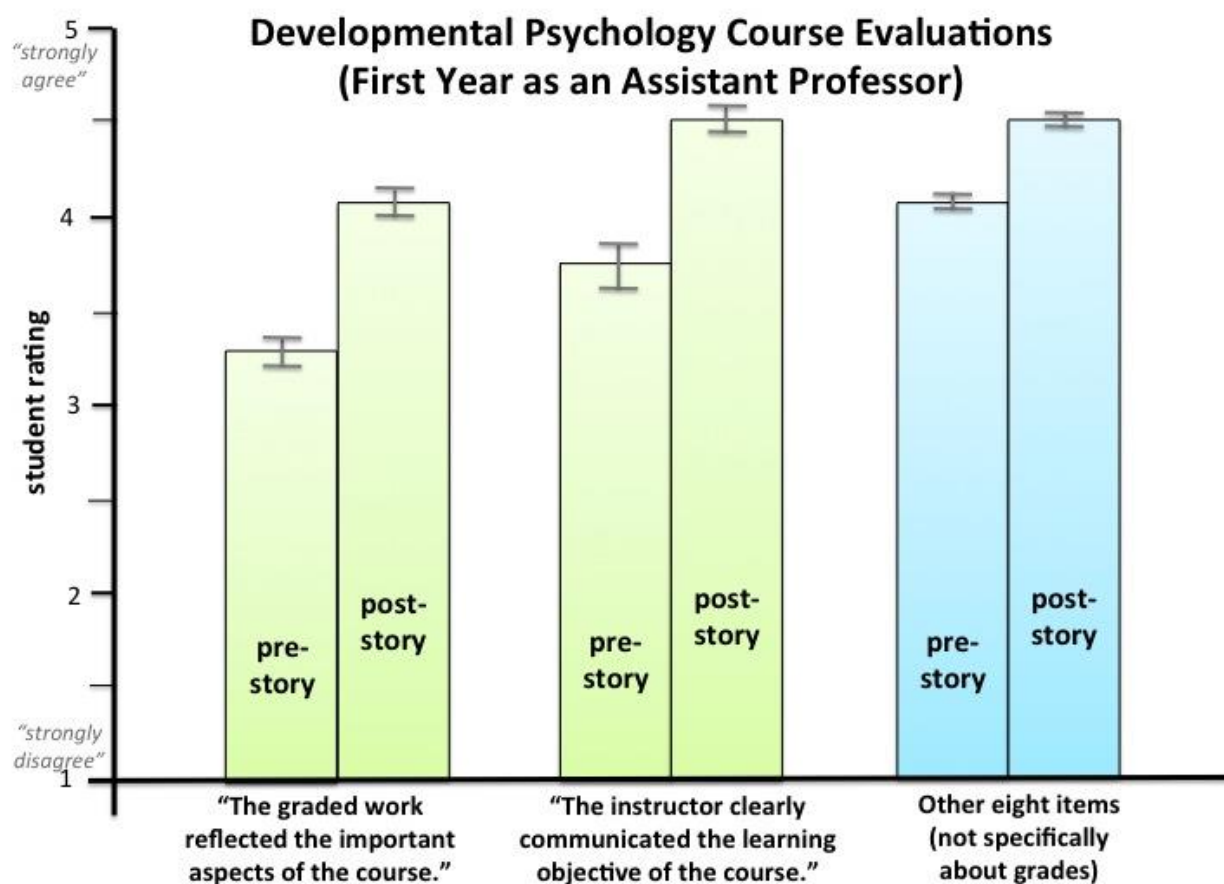


Figure 1. Course Evaluation Means Pre- and Post-Story about Expectations for Students' Learning

Do Stories Help Students Learn?

Students like stories. As Fernald (1987) revised his Introductory Psychology textbook to include more rich stories, his students rated the chapters as more enjoyable to read³. Even the studies students remember most vividly are those that feel like stories. In Milgram's Obedience Studies we have a simple conflict between authority and protagonist, vivid imagery with a shock generator, and a surprise ending in how far people will go (Kotre, 1992). But is there experimental evidence that stories foster remembering and learning?

Experiments using widely different comparisons and many kinds of students consistently show recall benefits with stories. Bower and Clark (1969) used the most simple of narratives and found the largest effect size I have seen in all of Psychology. When participants were asked to recall serial lists of unrelated nouns (e.g., "DINNER, NERVE, TEACHER, FLOOD, BARREL, RATTLE, VESSEL, HARBOR, ARTIST, CASTLE"), they recalled 13%. Participants who were asked to recall the same serial lists embedded within stories recalled 93% (e.g., "One night at DINNER I had the NERVE to bring my TEACHER. There had been a FLOOD that day, and the rain BARREL was sure to RATTLE. There was, however, a VESSEL in the HARBOR carrying this ARTIST to my CASTLE."). When Instructional Media & Technology college students were randomly assigned to learn the ASSURE model with stories of its use, they remembered more than if they received an analogous lecture (Oaks, 1995). When twenty young adults (20- and 30 year-olds) and twenty older adults (60- and 70 year-olds) read expository passages and narrative passages, participants read the narratives faster and recalled more information from the narratives regardless of age or experimental manipulation (Zabrocky & Moore, 1999). When intro psychology students listened to recordings of narratives (e.g., *The Princess and the Pea*) and expositions of similar familiarity (e.g., coal energy), their recognition and recall memory were better for the narratives than expositions (Graesser, Hauff-Smith, Cohen & Pyles, 1980). To illustrate these empirical findings, consider Abrahamson's (2005) recollection of sharing a story about a pink Cadillac with his intro students. One student bumped into him 10 years later and asked if the pink Cadillac story was actually true. Abrahamson said he'd only answer if the student remembered the psychological concept it was used to illustrate. He did.

Experiments suggest that stories benefit long-term learning, skill knowledge, and depth of conceptual understanding. For example, fourth- and fifth-grade students played a computer game that involved order-of-operations. In four experimental conditions children played the games within story contexts (e.g., space adventure, treasure hunt). In a control condition they played with purely abstract numbers. Children in every story condition wanted to keep playing the game longer than those in the control condition. On a math skills post-test one week later, students who played within any story condition outperformed those in the control condition (Cordova & Lepper, 1996). Similar results were found with undergraduates. Women were asked to read technical guides about fixing car problems or stories about women solving those problems. The three story conditions ranged from a minimalist version where the protagonist faces the problem and resolves it, to a version adding dialogue and step-by-step instructions. Reading times did not differ significantly, but those who read any of the story contexts answered more questions about fixing cars correctly (Dowling, 2009). Finally, and perhaps most important for generalizing learning, when kindergartners were taught about geometry embedded within a story-context they were more capable of near- and far-analogical transfer. The story context especially helped girls (Casey, Cedar, & Young, 2007).

³ For a collection of primary source stories organized by common topics in Introductory Psychology, I recommend Stoddart & McKinley (2006).

Are Personal Stories more Powerful than Other Stories?

Personal stories may have a stronger impact than other stories, but only when the student finds personal relevance in them. In one study participants watched a short lecture about personality in which the instructor did or did not incorporate details about himself. Those who watched the instructor make self-disclosures scored higher on the subsequent quiz, $\Delta R^2=.04$ (Stoltz, Young, & Bryant, 2014). In another study, Introductory Psychology students were randomly assigned to one of three classes about classical conditioning: lecture only, lecture plus instructor's personal story, or lecture plus instructor's personal story and a student reflection exercise. Students who learned with the instructor's self-disclosure and the nudge for self-reflection performed better on a subsequent test than those who only heard the lecture (LeTexier, 2008). Learning about a related concept in another study, students were randomly assigned to listen to an audio recording of a male teacher explain learned helplessness with a personal story (first-person) or the identical story in third-person. Hearing a personal narrative was helpful for students who were men, but not for women (McCarthy & Scheck, 1982). Outside the classroom, a meta-analysis found that patients' medical decisions were impacted by the inclusion of stories with medical information. When the stories were first-person accounts, in these obviously personally relevant circumstances, the effect size first personal stories impacting behavior was twice as large as third-person accounts (Winterbottom, Bekker, Conner, & Mooney, 2008). People are moved more strongly by personal stories when they are relevant, whether that relevance comes through experimental manipulation, gender identity, or identification with someone suffering from the same illness.

The Present Study

As described previously, even the most simple stories enhance students' memory, and stories benefit students' learning most when they are vividly personally relevant. Most of the aforementioned studies used between-subjects designs. Many were experiments, which manipulated experience rather than examining naturally occurring interactions as they happen in a typical class. None analyzed the consequence of the naturally occurring ebb and flow of storytelling during a class..

To further test the power of stories, I kept track of the key concepts I explained using one of several kinds of stories in one class for one semester. Students in my large lecture *Introduction to Psychology* class took three non-cumulative tests equally spaced throughout the semester. I recorded the key concept tested by each question. There was no class textbook. Instead I provided students with all class slides including key concepts highlighted and defined. The slides did not include any of the stories that I shared in class. Students knew that I was recording attendance, but also that it would not be count in their grades. Median attendance excluding test days was 75%. I predicted that students who attended class regularly would perform better on all test items, but that the benefit of attendance would be greatest when the key concepts were taught with a story.

One hundred seventy-four (174) students completed the semester. The typical student was female (71%), a freshman (64%) or sophomore (23%), and about 20 years old ($x=19.58$ $sd=1.97$). Students were ethnically diverse: 41% Hispanic, 28% Caucasian, and 18% African American. The most common majors were psychology (41%), kinesiology (20%), biology (14%), and marine science (7%). The three tests included a total of 182 multiple-choice questions categorized mostly as control items on topics without a story (59%); see table for a summary of items.

Table 1
Classification of Test Items by Story Kind

LTR	N	Description of Item Kind
C	107	Control (topic presented without a story)
I	6	Integrate across Topics (required students to integrate across concepts so no single story category could be ascribed)
S	8	Study as Story (e.g., Milgram Study)
V	14	Video as Story (e.g., watching Strange Situation videos while instructor leads discussion and narrates evidence for each attachment style)
A	15	In-Class Activity as Personal Experience (e.g., students completed original Water Jug experiment and witnessed their own use of mental set)
E	15	Extended Story Told by Instructor (e.g., Little Albert story; resolving the mystery as well as and the rise and fall of John Watson).
P	17	Extended Personal Story of Instructor (a true first-person account that was more than a single statement of self-disclosure).

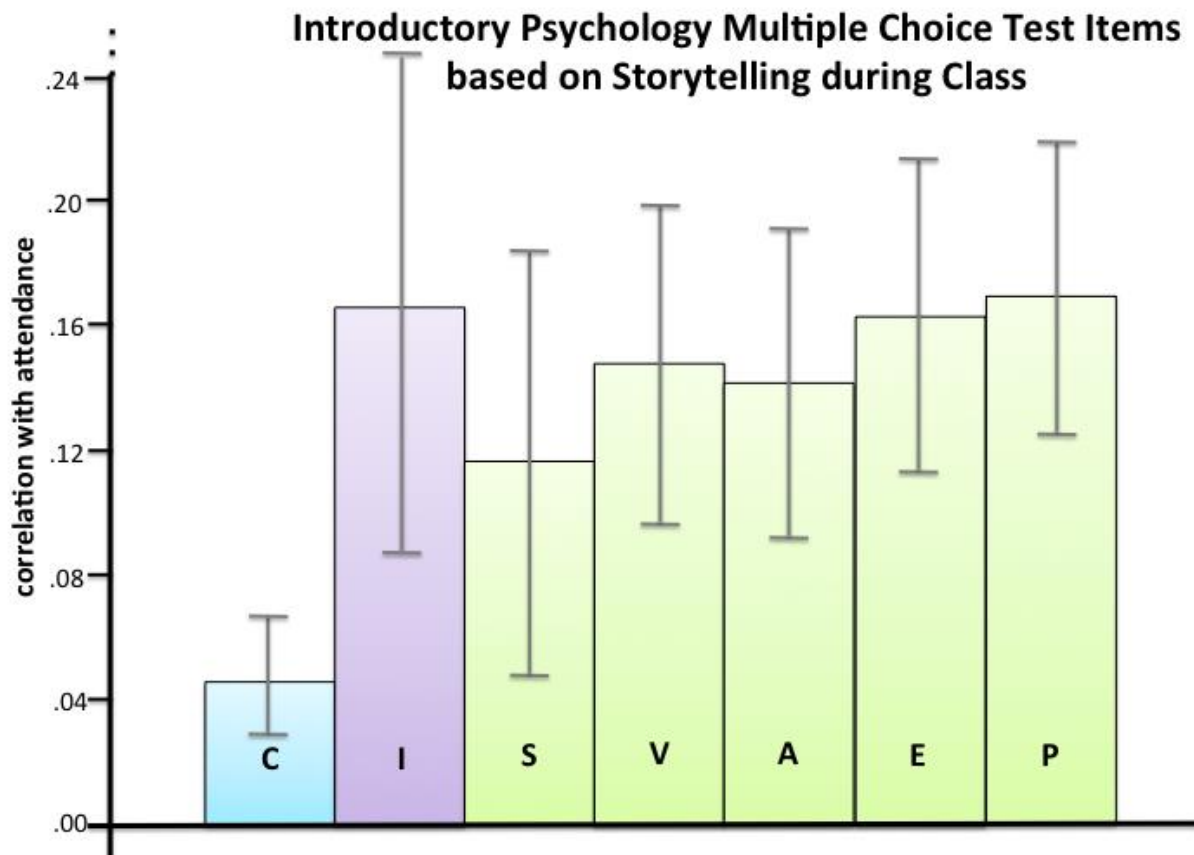


Figure 2. Mean Correlation of Test Performance with Attendance by Kind of Story during Class

One statistical approach is to treat each of the 182 items as the unit of analysis and the correlation of the item with attendance as the dependent variable. The one-way between-subject ANOVA revealed a main effect of item kind, $F(1,6)=8.748$, $p<.0005$. Tukey HSD post-hoc tests reveal that all item kinds but the control are equivalent (p-values range from .850 and 1.000). Though most story item kinds differed from control, post-hoc tests revealed that the Integrate Across Topics items differed only marginally from control items ($p=.063$ two-tailed), and that the Study as Story items did not differ from control items ($p=.55$ two-tailed). The lack of a statistically significant difference is likely due to power, as there were only six- and eight of each kind of item, respectively. The 95% confidence intervals show the expected directions: students who attended class more often performed better on every kind of test question (including controls), but the correlation with attendance is greater when items involved stories or were more challenging by requiring students to integrate across concepts (figure 2).

A more intuitive statistical approach is to treat students as the primary unit of analysis and attendance as a secondary factor, with the percent answering items correctly as the dependent variable. For further intuitive clarity I treated a median split of attendance as a between-subject factor. Item kind becomes a within-subject variable, eliminating the small N for two conditions, albeit at the expense of precision. The 2 (attendance) by 7 (item kind) ANOVA revealed a main effect of test item kind, $F(6,167)=16.460$, $p<.0005$ suggesting items varied in difficulty. A main effect of attendance, $F(1,172)=40.852$, $p<.0005$, shows the benefit of attending class for all kinds of test items. A significant interaction, $F(6,167)=10.479$, $p<.005$, suggests that the benefit for attending class differs by item kind. Inspection of the 95% confidence intervals shows that the control items barely differed by attendance, probably because slides with definitions were provided to students, while the gap between those who attend regularly and those who do not is larger for all other item kinds (figure 3).

Considering both statistical analyses together, an interesting pattern emerges. The test items that integrate across concepts have a much stronger correlation with attendance than control items, because these items are quite difficult for students who miss class often. In sharp contrast, the stronger correlations for the kinds of stories with attendance are explained by the fact that attendance facilitated students' ability to correctly answer items (compared with controls).

Results of the present study are consistent with the larger body of research associating student learning with storytelling. The use of stories benefits students' memory and learning for material. Personal storytelling by instructors is one kind of story that benefits students. But personal stories are not more powerful than others. I next consider how do students perceive their learning, feel motivated, and feel a positive attitude toward class as a consequence of the emotional connection instructors make through their stories.

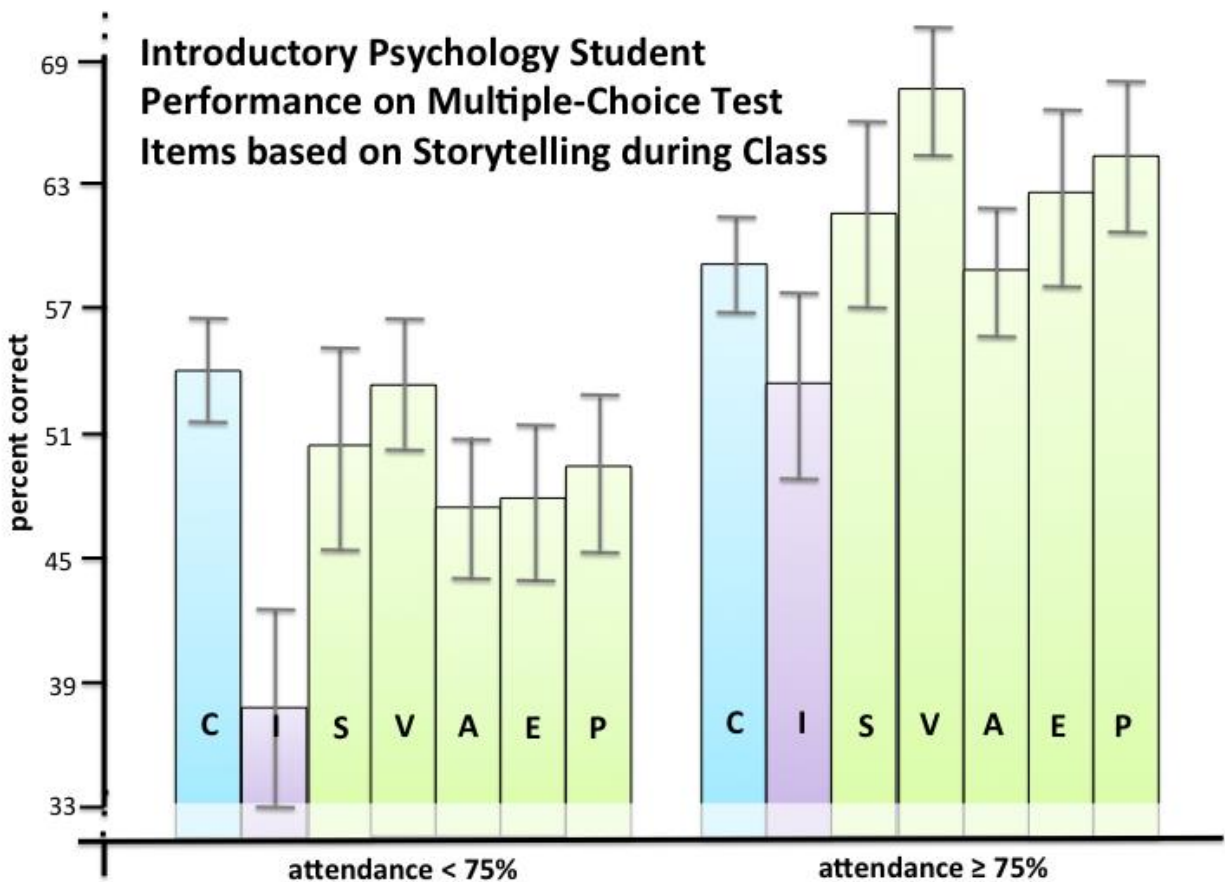


Figure 3. Mean Percent Correct on Test Items by Kind of Story during Class and Student Attendance

How Do Students Perceive their Learning when we Connect with Personal Stories?

So we packed up our entire house into a rental truck for our cross-country move. It was exhausting, but fortunately I had the foresight to leave our mattress out so we could sleep through the night and start our drive in the morning. We slept comfortably in our eerily empty house, stuffed the mattress standing up in the last few inches we had at the back of the truck, closed the rolling garage-style door to the back, and we were on our way! It turns out when you drive through the south of Texas, they stop every truck to look for illegal immigrants. I had to open the back. But I couldn't! I got the door about a foot up and it was stuck. The officer responded to my look of concern by saying not to worry about it. Fortunately I could get the door back down. But I did worry about it. When we eventually arrived at our new home, I tried harder to open it. No matter how hard I pulled, the door wouldn't go up. I tried contorting my body to reach inside and push whatever was blocking the door, but that didn't work either. I did figure out what happened. Everything jostled

about as we drove and the giant piles of boxes and stuff shifted and fell in just such a way as to knock the mattress over. The weight of all of our stuff was pinning our mattress to the door! I called the rental company, but their only suggestion was a costly procedure of pulling up the roof of the truck. What could I do?

If you were in my physics class, I might genuinely ask, “what could I do?” Rather than sharing that story, I might have saved time by simply making up a problem for students:

A very heavy object sits in the back of a truck bed. How can you move it to the front of the truck bed without touching anything in the back of the truck?

Whether we use the story or the example, students apply the same physics principle in exactly the same way to analogous situations.⁴ I would teach with the personal story, not because of the specific skill students learn, but because the story means so much more as a genuine real-world application (rather than a word problem students feel is artificial even if its “dressed up” as the real world). Personal storytelling fosters a genuine connection between students and teachers as we solve the dilemma together.

We might enhance how strongly students feel connected to us with our personal stories. “Immediacy” is the psychological closeness students feel with their teacher (Gorham, 1988). Immediacy is formed non-verbally (e.g., instructor smiling, moving about, using relaxed body language) and verbally (e.g., sharing personal examples, using humor, self-disclosing, referring to “our” class rather than “my” class). Personal storytelling is a core component of immediacy. Studies consistently find that when students feel more immediacy with us, they believe they are acquiring more knowledge (“cognitive learning”), have more positive feelings about the knowledge and skills we share (“affective learning”), and observe the consequences of their learning in their actions (“behavioral learning”) (e.g., Nussbaum & Scott, 1980). The correlations of immediacy with affective, behavioral, and cognitive learning are especially strong for larger lecture classes (Gorham, 1988). The correlation is found across multicultural classrooms of Latino and Asian faculty, but it is especially strong for African American and Caucasian faculty (Sanders & Wiseman, 1990).

Though self-disclosure enhances immediacy, at times students view it as misbehavior. Two studies conducted almost 25 years apart show strikingly similar results (Kearney et al., 1991; Goodboy & Myers, 2015). In both studies, the two most frequently identified instances of instructor misbehavior were not showing up for class and making sarcastic putdowns of students. In both studies, a misbehavior often identified in faculty was, “talks too much about personal life, gets off topic, does not focus on subject” (rank #2, #11). In both studies factor analyses revealed three dimensions of instructor misbehavior: incompetence / non-engaging style, offensiveness / antagonism, and either poor enunciation or poor organization. Straying from the topic did not load well on any of these factors. Though students are quick to identify off-topic comments as misbehaviors, they do not consider them central to what it means to be a “bad teacher.” Self-disclosure is not intrinsically

⁴ For those who are curious, I solved the dilemma using the Law of Inertia (Newton’s First Law), “An object in motion tends to stay in motion ...” I left the door open a foot up, drove around the block slowly and made sure no one was around. I put on the blinkers. Then I slammed the gas pedal and got up to 20 *mph* for a few seconds. Then I slammed the brake. Screech!!! My external force (the brake) had stopped the truck but it didn’t stop all of our stuff. Objects, like stuff, in motion stay in motion. In this case all the stuff continued moving forward. Since the door was partially open and everything came off it for a few seconds, the truck back door slid up. When this actually happened I purposely slammed the brake while going down a hill, so I was also applying Newton’s Second Law too.

“misbehavior” in students’ perceptions. When faculty self-disclose more, relevant, and positive aspects of themselves, we find the same positive correlations with affective, behavioral, and cognitive learning as we do with immediacy (Goodboy, Carton, Goldman, Gozanski, Tyler, & Johnson. 2014).

Rather than studying good versus bad instructor behavior and finding self-disclosures among those behaviors, Sorensen (1989) asked students to identify previously-gathered examples of self-disclosures as coming from good or bad teachers. Table 2 contain the top 5 self-disclosures that discriminate between kinds of teachers (all Cohen’s $d > .92$, $r^2 > 17.5\%$).

Table 2.

Kinds of Instructor Self-Disclosure that most Discriminate Instructor Quality

Good teachers are more likely to disclose the following than poor teachers:

- I care about my students.
- If you cheat, you are cheating yourself.
- I’d love to spend a year or two travelling around the country meeting people.
- I enjoy playing with my children.
- I’ve tried to teach my children race, religion, or social class shouldn’t affect their relations with people.

Poor teachers are more likely to disclose the following than good teachers:

- Students should be seen and not heard.
- I may be stubborn but it’s only because I’m right.
- My spouse and I fight constantly.
- I am the most knowledgeable person in my field.
- I don’t make friends easily.

Students seem to infer a level of warmth from faculty self-disclosure. This is sensible as warmth is one of two cross-culturally universal attributes people like (e.g., Fiske et al., 2010), and one of the two central traits people use to infer more broadly about someone’s personality (e.g., Asch, 1946). We should consider how we’re portraying our warmth in our personal stories. The other central cross-culturally universal trait is competence, and we would probably benefit by considering what our personal stories say about our competence too. Upon reflection, I notice that many of my stories reveal incompetence in the name of humor (e.g., not always logically using statistics, not the best computer programmer, lacking foresight about how objects shift in a truck). In part I feel this may be okay because the ideals from which I fall short are ones most students are less interested in. I also know that students tend to think I am very knowledgeable because I often make side comments about connections of Psychology to other sciences, history, philosophy, and literature. It may be that self-deprecating humor is appreciated much like the classic study in which an especially competent quiz bowl contestant goofily spills coffee in a pratfall (Aronson, Willerman, & Floyd, 1966).

If you are currently apprehensive about whether students perceive you as competent, I recommend thinking of personal stories that illustrate your competence. When discussing a famous person’s theory, you make that person seem real by embedding a personal story of your interactions with them. You can discuss your experience conducting research in an area. If you figured out how to use a new method, or how to resolve a debate, or extend a concept, you can share it as a personal story. That would illustrate the dynamic nature of science that is often lost when students merely

read established conclusions in a textbook. You can share stories where you applied class concepts to solve everyday problems (e.g., negotiating to buy a car).

Applications illustrate the value of knowledge beyond the classroom. Just always make sure that the story illustrates the relevant class concept first and foremost. Otherwise students could infer that you are making one of the self-disclosures that most defines a poor instructor, “I am the most knowledgeable person in my field” (see table above).

The value of warmth is unequivocal, not only for affective, behavioral, and cognitive learning, but also for motivating students. When students were asked to rate a diverse range of instructor behaviors for how much they would motivate or demotivate them to learn, a single factor accounted for 44% of the variance. Motivation came from a dimension defined by relevant positive self-disclosures, warmth, relating class content to personal experience, competence, and immediacy. The demotivating end of this dimension was defined by condescension, rigidity, anger, a tendency to digress, and to be unapproachable (Gorham & Christophel, 1992).

Though it is simple to say that faculty should be warm in order to foster positive feelings and motivation among students, warmth may be one of the most challenging qualities for faculty to exhibit. Ironically, in my observation, it is new faculty who have the warmest personalities who end up faltering most with warmth in the classroom - falling into a sarcastic, condescending, angry style that students find so demotivating. These instructors become engrossed in how much they care for their students and the subject, only to find their teaching met with a sea of emotionless faces staring back at them. It's easy to become listless yourself when responding to bored-looking students. I often make a joke about this when I teach about emotion contagion. We need to inhibit absorbing lethargy, and instead transmit enthusiasm in hopes that we can spark more student engagement. One way to make this less difficult is to realize that students' faces may reflect an unfortunate norm of the classroom rather than genuine affect. Many times a student who looked utterly disinterested during class spoke with me later expressing great enthusiasm. A second way to make this less difficult is to embed stories in which we're warm so students think of us as warm. I have found that sharing sincere, funny stories gradually turns even students in the largest lecture hall into enthusiastic participants. What does research say about how self-disclosure and storytelling alter students' behavior?

How do Self-Disclosure & Storytelling Impact Students' Engagement, Attitude, & Behavior?

Teacher self-disclosure correlates with students' behavior in class. When instructors self-disclose irrelevant and negative stories, students engage in more uncivil behaviors (Trad et al., 2012). When instructors self-disclose relevant and positive stories, students engage in less uncivil behavior like texting during class, packing up before class is over, and complaining about class (Trad et al., 2012; Goodboy et al., 2014). Positive and relevant self-disclosures by faculty also predict greater student motivation (Goodboy et al., 2014), more class participation (Goldstein & Benassi, 1994), and more self-disclosures by students that are relevant to class, such as how they are struggling with class material (Cayanus, Martin, & Goodboy, 2009; Goodboy et al., 2014). Additional evidence suggests that instructors are not merely a correlate, but a cause of student behavior. DeWine, Bennett, & Medcalf (1978) randomly assigned instructors to either make at least four self-disclosures each class or to limit their stories to third-person narratives. Students who heard their instructors self-disclose were more likely to self-disclose to classmates, friends, and instructors in class-relevant ways.

Better classroom behavior may be the result of greater student engagement through storytelling. For example, when I share the story of counter-factual thinking that I began with, I sometimes forget to finish (like here). Ten minutes later as we switch to a new concept, a student will ask, "Is Abigail okay?" She is! She was born happy and healthy, and today she's a happy, healthy, thriving first grader. Thank you for asking! Empirical research shows the same pattern of engagement. Coal miners watching 15-minute safety videos especially appreciated how the videos went beyond procedures by including other miners sharing personal stories (Cullen & Fein, 2005). Similarly, farmers learning about the value of installing roll-over protection devices on their tractors were especially engaged by stories of other farmers' experiences and found those stories just as persuasive as statistical evidence (Morgan, Cole, Struttman, & Piercy, 2002).

We might worry that serious students would construe stories as a distraction or find it condescending to imply that they need stories to understand course material. But I can find no studies supporting that impression. Instead, at the conclusion of a semester where the teacher had shared many personal stories of her nursing experiences with nursing students, she asked about their attitudes toward the stories with a variety of statements on a Likert scale. The students most strongly agreed that the stories made class more interesting and that the vivid context made remembering content easier. They most strongly disagreed that the stories were inappropriate, a waste of time, or were unneeded by professional students (Davidhizar & Lonser 2003).

Stories lead to more positive attitudes about the class subject. In a 9th grade chemistry class, students were randomly assigned to learn about covalent bonds in one of two conditions. Students in the control condition learned the traditional description about pairs of electrons shared between atoms such that the attractive and repulsive forces balance. Students in the experimental condition heard an analogy with a narrative about "boy" electrons and "girl" protons. A pre-/post-evaluation found that students in the narrative condition learned more and increased their positive attitudes toward chemistry more than students in the control condition. Similarly, 228 fourth and fifth grade history students were randomly assigned to a conventional history lecture with either extra note-taking instruction or the addition of oral narratives. When students listened to and participated in oral narratives, their affinity for history increased (Watts, 2008). Using a correlational design, Nussbaum and Scott (1979) found that when their students rated them as higher in self-disclosure, introductory interpersonal communication instructors had students who rated their own attitudes toward the subject and their instructor more positively.

When students are engaged and have positive attitudes, they might be more likely to feel that they can apply course concepts in their everyday lives. Storytelling helped African American adults in a disadvantaged neighborhood learn about diabetes and high-blood pressure, in addition to increasing their self-efficacy (Bertera, 2014). We also find evidence for changing behavior by systematic manipulation of elements in stories. Diekman, McDonald, and Gardner (2000) rewrote romance novels to incorporate safe sex practices. Women who read the revised novels reported more positive attitudes toward condom use and greater behavioral intentions to follow safe sex practices. Through personal storytelling, students are more engaged, more positive about the subject, and more likely to apply class concepts in their actions. Do these intellectual and emotional benefits to students lead to better evaluations of instructors?

How do Students Evaluate Instructors who Self-Disclose?

Well thought through self-disclosures earn positive evaluations from students. For example, students evaluated their college professors more positively when their self-disclosures were: intentional (e.g., provided examples of class concepts, $r=.38$), positive ($r=.26$), and honest ($r=.54$) (Lannutti & Strauman, 2006). The effect can be quite large, as when teacher communication style, including immediacy and the amount, intentionality, and positivity of self-disclosure, accounted for 30% of the variance in instructor evaluations (Scott & Nussbaum, 1981). These findings were replicated two decades later using a hierarchical regression model: course-relevant self-disclosure accounted for 5% of the variance in positive teacher evaluations; positivity of self-disclosure added an additional 3%, and the overall amount of self disclosure added an additional 2% (Cayanus & Martin, 2008). Does the relationship between personal storytelling and course evaluations hold across cultural contexts or when evaluations are multi-dimensional?

One consideration about the power of self-disclosure may be cultural norms and values. For example, when men self-disclose insecurities in vignettes they are judged as less mentally healthy. When women in identical vignettes self-disclose the same insecurities, they are judged as more mentally healthy (e.g., Derlega & Chaiken, 1976). Self-disclosure norms across cultures are greater than gender norms. People in independent, individualistic cultures (e.g., United States) self-disclose more readily than those in interdependent, communal cultures (e.g., China). Even so, across cultures people self-disclose more to those with whom they have greater intimacy. When American male professors made more self-disclosures, their American male students rated them more negatively, $r = -.419$, whereas there was no significant correlation between Chinese male professors and their Chinese male students, $r = -.081$. When the American professors made more intentional ($r = .255$) and honest ($r = .338$) self-disclosures they were rated more positively by their students; ratings of Chinese professors showed even stronger positive effects, $r=.461$ & $r=.688$ (Zhai, 2012). Despite diverse cultural differences the value of relevant personal stories is surprisingly similar.

Unlike course evaluations that tend to vary from negative to positive, a more nuanced measure may be instructor credibility. Instructor credibility is comprised of three related but separable dimensions: competence, caring, and character. Three independent groups of students described what differentiated a professor as high or low in a single dimension of credibility. Each group arrived at the same conclusion about self-disclosure: as long as self-disclosure is course-relevant, it enhances credibility (Myers, Brann, & COMM-600, 2009). A study using a correlational methodology arrived at the same conclusion. When instructors self-disclosed more, relevant to course content, and without making students uncomfortable, students rated their instructors as more credible across all three dimensions (Schrot, 2013). Using an SEM model, Miller, Katt, Brown, & Sivo (2014) replicated the finding that more relevant and positive self-disclosures led to high ratings of credibility. In turn, these perceptions of credibility led students to engage in less incivility (e.g., arriving late, engaging in side conversations, rolling their eyes, packing up and leaving class early). Carefully considered personal storytelling benefits students' learning, attitude, engagement, and behavior. It also benefits instructors on evaluations. Perhaps the only concern we may have with sharing stories is whether it's a style antithetical to science.

The Plural of Anecdote is not Data

The use of personal storytelling, or any storytelling, might raise ethical considerations for faculty of psychology and other sciences. We have seen that vivid stories are compelling and that sharing

anecdotes might augment our data as well as help shape public policy and behavior for the better (e.g., Dahlstrom, 2014). Even so, stories can hinder scientific communication. Medical doctors have been alarmed by falling immunization rates as once vivid personal stories of epidemics fade into history (e.g., polio) and the rise of personal stories of harm due to vaccines become widespread. Scientific data are usually more complex than the simple messages commonplace in advertising and politics (e.g., some people do suffer adverse reactions to vaccines). Some in the medical community have reacted with vivid accounts of modern-day true stories of death or loss-of-limbs due to vaccine-preventable diseases (Cunningham & Boom, 2013). That storytelling worked. Yet the persuasive power of anecdotal evidence is independent of scientific evidence. To convey a conservative policy on welfare-reform, then presidential hopeful Ronald Reagan often told the true story of Linda Taylor, who fraudulently manipulated the welfare system to live in luxury⁵. Not surprisingly, presenting people with a story about such a “welfare queen” and labeling it typical of people on welfare, reduced participants’ support for traditional welfare policies. Perhaps surprisingly, when participants were presented with the same story and told it was atypical of welfare recipients, their attitudes were still swayed against welfare (Hamill, Wilson, & Nisbett, 1980). Vivid stories work, and they work whether they support or refute the statistical and scientific evidence.

Some scientists suggest we reduce our credibility if we use anecdotes like journalists, instead of remaining pure in our descriptions of the empirical evidence (e.g., Katz, 2013). Clearly it would be immoral to tell false stories to counter scientific truth. Beyond that, there may be no easy answer. I personally feel no moral conflict between teaching science and storytelling. From my perspective, when we teach science, we should neither aim to school students into accepting a particular truth nor aim to persuade them of a particular public policy. For example, I do not share my story about counter-factual thinking to convince anyone of the “right” answer about storing cord blood. Education is not about bringing students to conclusion, but opening them up to thinking more deeply and broadly than they might otherwise. In this respect, storytelling might be the most profound way to teach.

Sharing personal stories can mimic the process of scientists observing reality, pondering questions, and proposing hypotheses. Usually we sharpen and level details of our stories to make the principle that we’re teaching perfectly clear. But on the last day of class I tell stories in the opposite way – I allow once pure stories to be messy, like reality. At any one moment in a single story, many psychological processes together explain a phenomenon. Within a single story I’ll highlight how neurological and biological processes below conscious awareness work; how perceptions can differ from reality; how I recall events from memory, however imperfectly; and how I solve problems and behave within a cultural context. As scientists, our explorations often wash over the complexity of the real world by controlling every variable except the experimental manipulation of interest, which we highlight. We arrive at well-established, replicable, and generalizable truths. Yet it can be challenging to recognize how these pure truths fit a messy reality. By sharing stories with students, we can highlight this oft forgotten last step in our theorizing.

Appreciating the dynamic nature of scientific inquiry and complex systems are two of the most challenging aspects of science to convey to students. Storytelling works. These benefits of personal storytelling compliment what we have seen in this literature review: students remember more, learn more, engage more, feel more positively toward the subject, behave in a more scholarly manner, and more often apply course concepts to their own lives.

⁵ e.g., ‘Welfare Queen’ becomes issue in Regan Campaign (1976, February 15), New York Times, p. 51

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Biographical Sketch

Katie Hope Grobman has taught mathematics to underprivileged elementary and middle school students, physics at an all-girls high school, and psychology to high school, undergraduate, and graduate students. She has taught a diverse range of college psychology classes including intro, social, developmental, and cognitive, as well as special topics in education, infancy, and creativity. She vividly remembers watching Carl Sagan's *Cosmos* as a little kid and feeling so much awe - we live upon a tiny planet, circling a humdrum star, lost in a galaxy tucked away in a forgotten corner of a universe of billions and billions of galaxies. Yet we are star stuff and we can contemplate the cosmos with science. Sagan inspired her to major in Physics and, while she eventually found exploring the human condition with science her awe-inspiring path, she is grateful to have learned so many sciences and love how they fit together. As an Assistant Professor of Psychology at California State University - Monterey Bay, she studies how we creatively solve problems and develop a deeper conceptual understanding through experiences with teachers and parents.