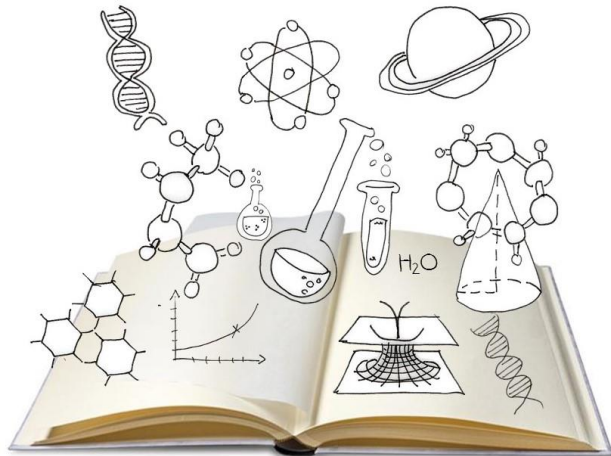


Tell Me a Story: Case Study Teaching in Science Utilizing Poll Everywhere, a Real-Time Student Response System

Sara Dye



By: Public Understanding of Science

<https://sagepus.blogspot.com/2016/06/how-do-scientists-tell-their-stories.html>



By Sara Dye, EdD, Ph.D. Year:
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Free For All Commercial Use / No Attribution Required / See <https://poll-everywhere.com/learn/> for what is not allowed.
Please Attribution to Poll Everywhere.

Global Disease Biology



Unique undergraduate major

Collaboration between

Department of Plant Pathology (CAES)

School of Veterinary Medicine

School of Medicine

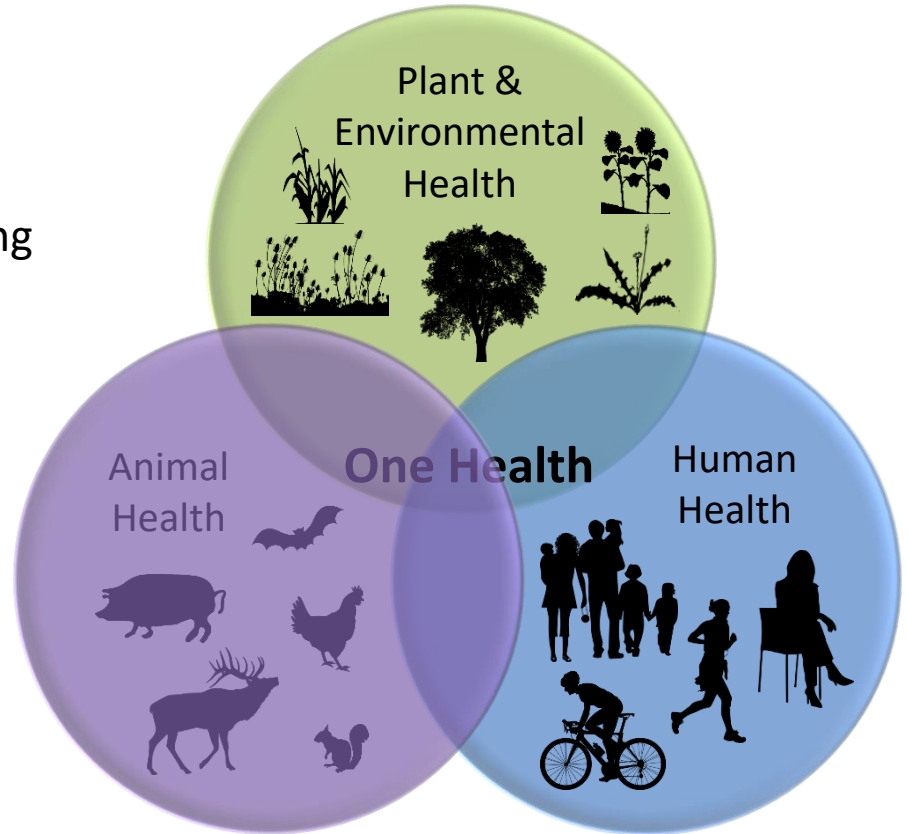


Global Disease Biology

Integrated **One Health** approach to solving global disease problems

Human, animal, plant, & environmental health are interlinked

Promote/advance creative and critical thinking skills via application to real-world scenarios



Case Study-Based Teaching

Learning via stories, or “...narrative cognition is thought to represent the default mode of human thought, providing structure to reality and serving as the underlying foundation for memory.”



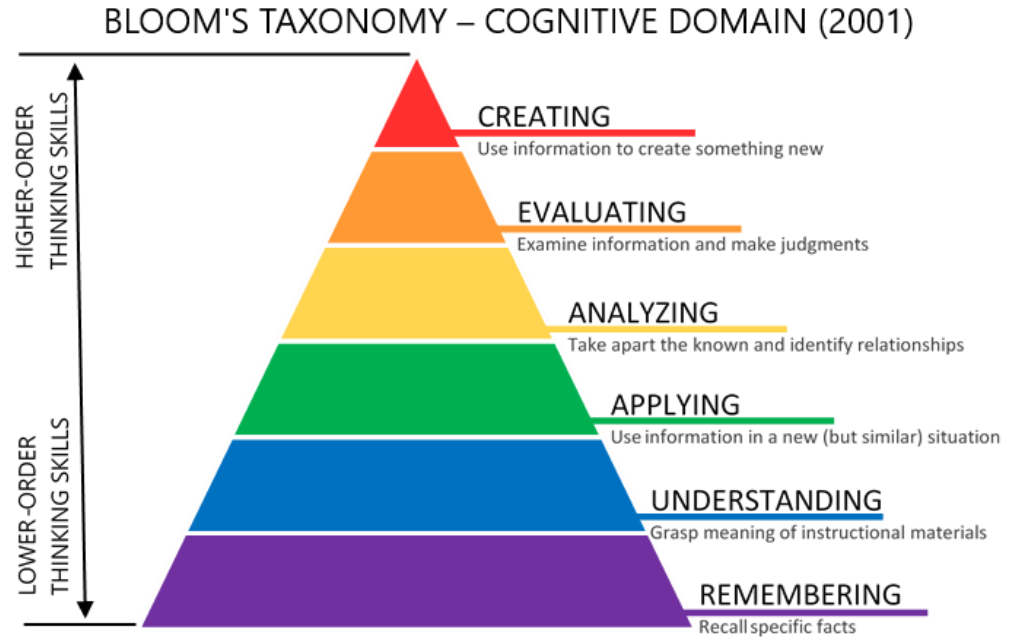
<https://www.enago.com/academy/storytelling-in-science-communicating-your-research-effectively/>

“Narratives offer increased comprehension, interest, and engagement.”

Case Study-Based Teaching

Draws students in—Engage in active learning and practice critical thinking without realizing it!

Case studies require that students move through different levels of Blooms taxonomy to determine solutions.



Interrupted method of case presentation

Information progressively revealed with interspersed classroom discussion

Topic/disease of case study is focus of lecture just prior to case study presentation

Cases unfold via PowerPoint—text, graphics, and video (make vivid & realistic)

Cases divided into several parts (~ 3-5)

At end of each part, open-ended questions about case posed to students

Students asked to discuss questions with students in neighboring seats



The problem



Jerry described the problem as rotting of the plants at the soil line. The leaves were yellow and wilting, and it was easy to pull them off the plant. The bases of the petioles were rotted and brown. White "threads" were visible on the rotted portion of the plant. Numerous, 1- to 2-mm-diameter, reddish brown spheres were scattered on the infected petioles and potting medium surface of the rotted plants but were absent from the plants without problems. At first Jerry thought these might be fertilizer granules, but the spheres were too small.



Plants not doing well
in the landscape
(Unhappy customers)



The Choice



"Mom, stop, just stop right there!" Carly said with more than a hint of anger in her voice. "Just look at Ian. He was a happy and interactive one-year-old. I take him in for his MMR shot at 15 months, just like my pediatrician said to, and a week later he stops smiling, he stops talking, and he stopped looking me in my eyes—he just slipped away. Jenny McCarthy has spoken with hundreds of parents of autistic children, all caused by the vaccine, and a highly respected scientist in Great Britain proved the connection."

I've lost Ian. And I'm responsible. I thought the vaccine would help, I was told it would help, and I held his tiny little hand while he took it. He didn't even cry. Now he is gone. And I'm scared. We're running out of time. Kristen has to choose. I don't want her to carry around the guilt that I will carry forever. I don't want us to lose Alissa, too."



Brad's farm

Just down the road from the land Margaret purchased is Greene Foods Farm, owned by Brad Greene. Greene Foods Farm is a large, family-owned, conventional (non-organic) farm that has been in operation for many decades and passed down through the generations of the Greene family. Brad grew up in the agricultural community and is well respected by other local farmers.

He keeps apprised of current consumer preferences and has recently found that demand for peppers seems to be steadily increasing, and therefore includes them in his rotation as often as possible.



**Greene Foods
Farm**

The Human Microbiome

Their family doctor diagnosed 16 year-old Amelia and her family with food poisoning and placed them all on antibiotics. While her brother and parents started feeling better relatively quickly, Amelia continued to suffer from gastrointestinal (GI) distress. She found that she couldn't leave her home because she was constantly running to the bathroom (10-12 times per day). Amelia was tired, had abdominal cramping, and little appetite.

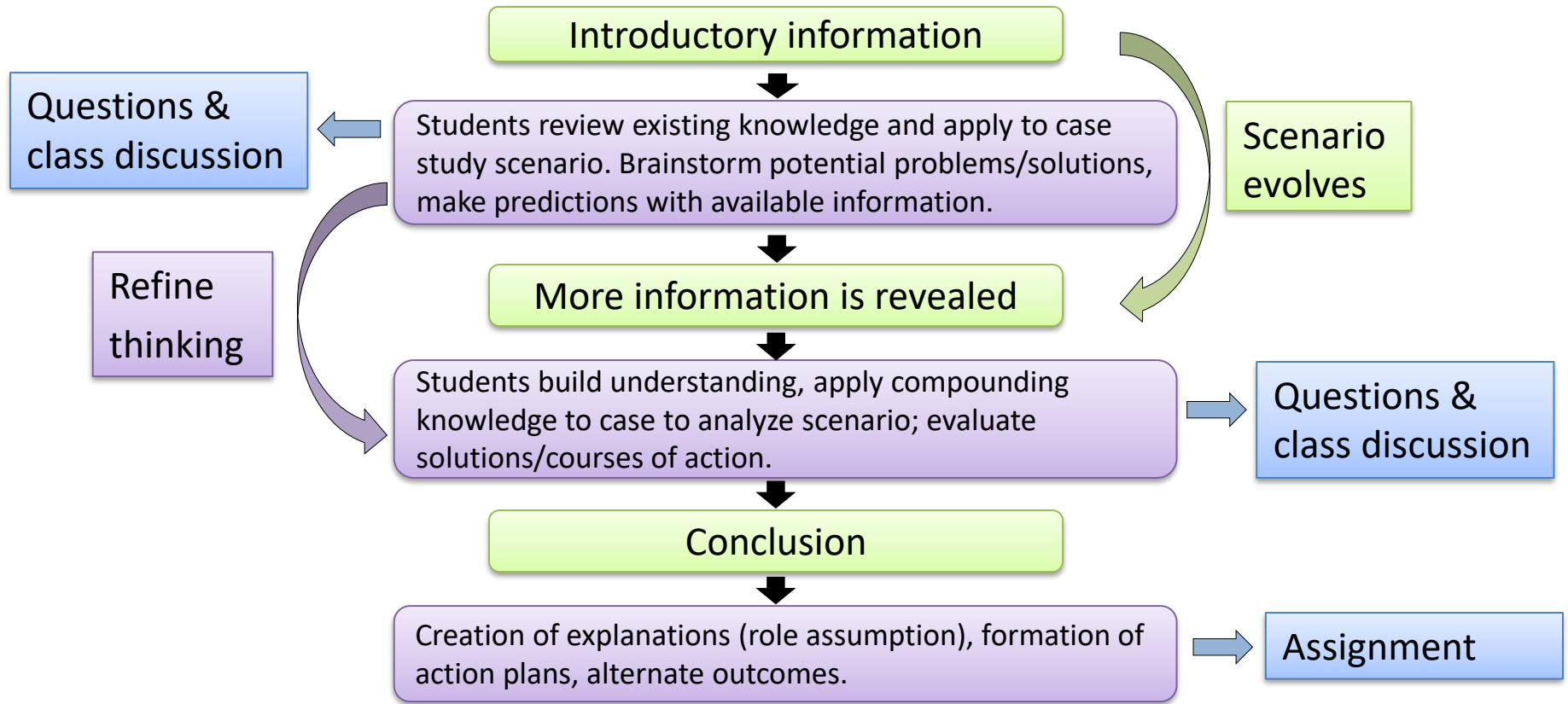


Living With Crohn's Disease: 1 Woman Shares Her Struggle | TODAY Original

TODAY 5.7M subscribers

<https://www.youtube.com/watch?v=4n6A1KgMMLU>

After visiting a gastroenterologist, Amelia was diagnosed with Crohn's disease (CD). CD is a chronic inflammatory bowel disease, where the immune cells in the intestine become overly sensitive to bacteria residing in the intestines causing pathologic inflammation in the lining of the GI tract. It typically presents in the last part of the small intestine.



Participation of all students in discussion is difficult:

All students cannot feasibly reply to each question
Many are hesitant to speak aloud in class



Embed questions into PowerPoint slides:

Displays students' short-answer responses in real time
Students respond via mobile phones or tablets/laptops

Do you think the hygiene hypothesis could be applicable to Amelia's case of Crohn's disease? Why or why not?

“ Yes, because of lack of exposure to Microbiome ”

“ Yes because she was initially exposed to a decreased amount of diversity of microbes ”

“ potentially we don't really know but it is a plausible cause for her lack of a matured immune system ”

When poll is active, respond at [PollEv.com/sararobinson686](https://poll-ev.com/sararobinson686)

Text SARAROBINSON686 to 37607 once to join

In one word, what is your overall analysis of Wakefield et al.'s findings?



If Brad 's peppers are infected with *P. capsici*, what symptoms and/or signs might be apparent upon careful inspection of the plants?



Cholera was called the "blue death" because victims are often cyanotic (blue colored) when they die. How might this symptomatology have supported the belief of Snow's contemporaries in the miasma theory?



“ Gas is inhaled and they had respiratory issues, so it seemed as if they were connected ”

“ Toxic gases lead to blue skin ”

First Attempt

PLP 120: *Introduction to Plant Pathology*

“The nature, cause, and control of plant diseases.”

Small, upper-division class (~40 students)

Lecture 2 hours/week, Laboratory 6 hours/week

Counts as a pathogen/disease course choice for GDB major

3 different case studies presented during 3 separate lab sessions

Follow-up assignment on Canvas:

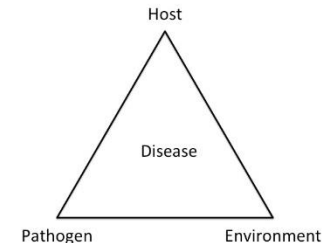
3-5 short answer questions due 1 week after case presented

Require thinking at analyzing, evaluating, creating levels of Bloom’s taxonomy

APS Education For Educators

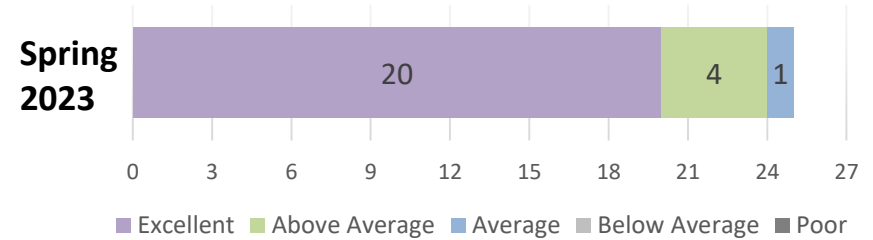
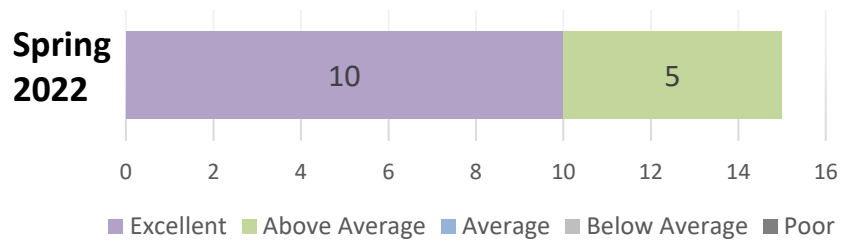
Share |    

For Educators

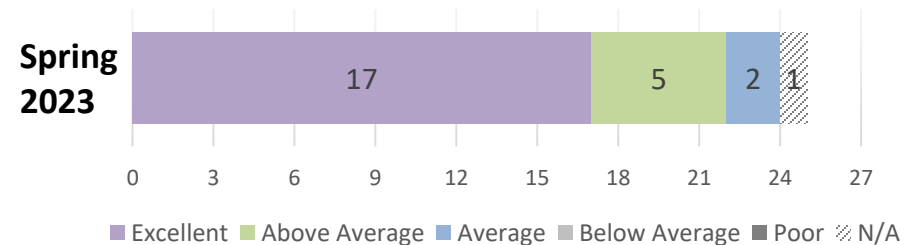
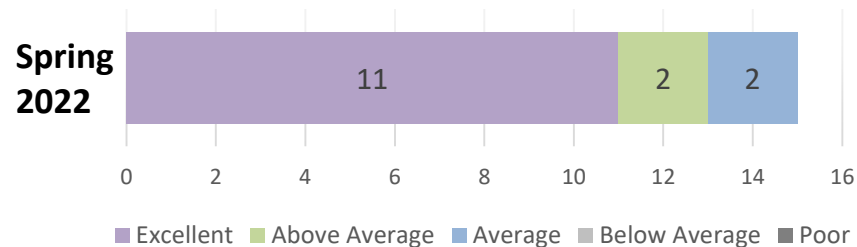


Results

Please indicate the value of the **case studies** in helping you to **think critically** about specific examples of plant disease and plant disease management and decision making.



Please indicate the value of the **Poll Everywhere** response system in facilitating **participation** in case study discussions during class.



Conclusions

PLP 120:

Sample size small

Trial of concept: Use of case studies/Poll Everywhere software

Need more extensive survey to better determine effectiveness

Majority of respondents indicated that the case studies helped them to **think critically** and that **Poll Everywhere** facilitated their **participation** in class discussion.



Personal observation: Students had **fun** answering the questions and using poll everywhere.



Case Study Teaching in a Large Classroom

SAS 13: *Disease and Society*

“Introduction to the concept of disease, the societal and personal impacts of past, present and future diseases, and the science behind disease discoveries, causes, evolution, diagnosis, treatment, and prevention.”

Large, lower-division class (250-350 students)

Lecture 3 hours/week

GE course but also required for GDB major/minor

3 different case studies presented during 3 separate lecture sessions

Follow-up quizzes on Canvas:

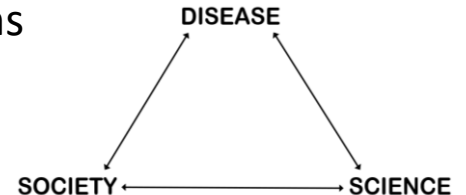
2 short-answer questions due 5 days after case presented

Require thinking at analyzing, evaluating, creating levels of Bloom’s taxonomy



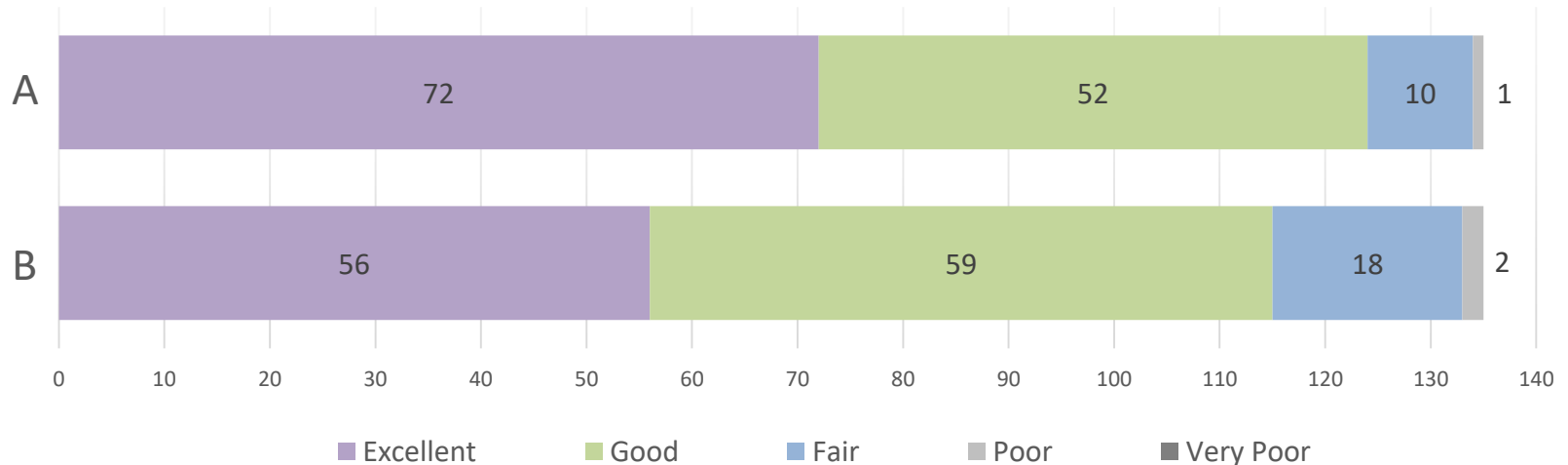
Enrich your students' educational experience with case-based teaching

The NCCSTS Case Collection, created and curated by the National Center for Case Study Teaching in Science, on behalf of the University at Buffalo, contains nearly a thousand peer-reviewed case studies on a variety of topics in all areas of science.



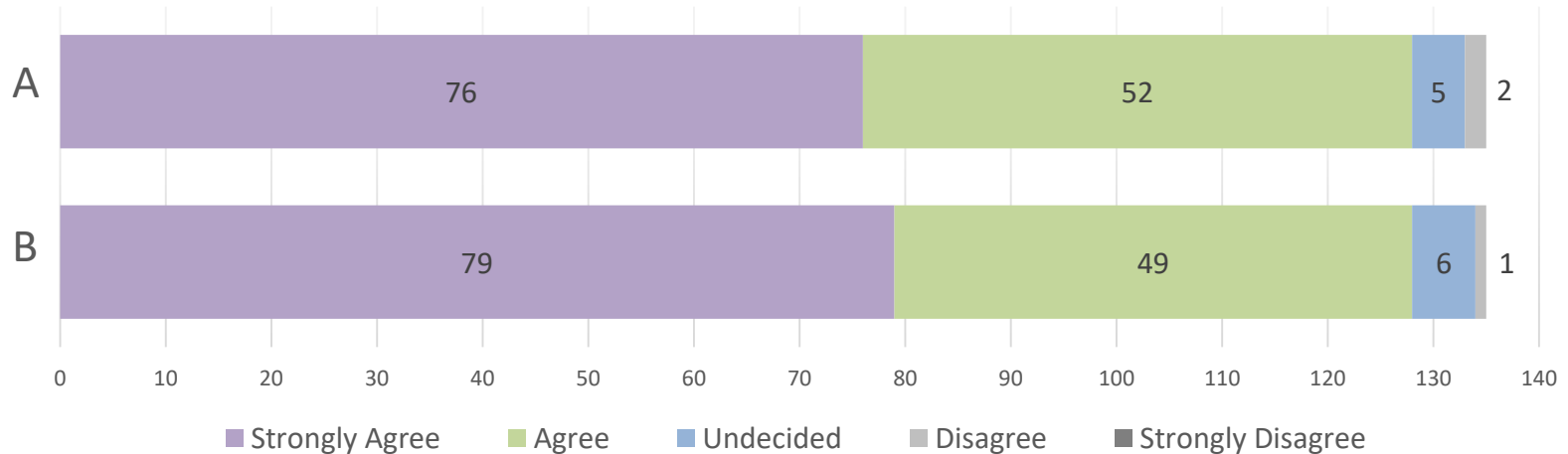
Results

- A. Please indicate the value of the **presentations and discussions** of the **case studies** in helping you to **think critically** about concepts related to disease and society.
- B. Please indicate the value of the **case study quizzes** in helping you to **think critically** about concepts related to disease and society.



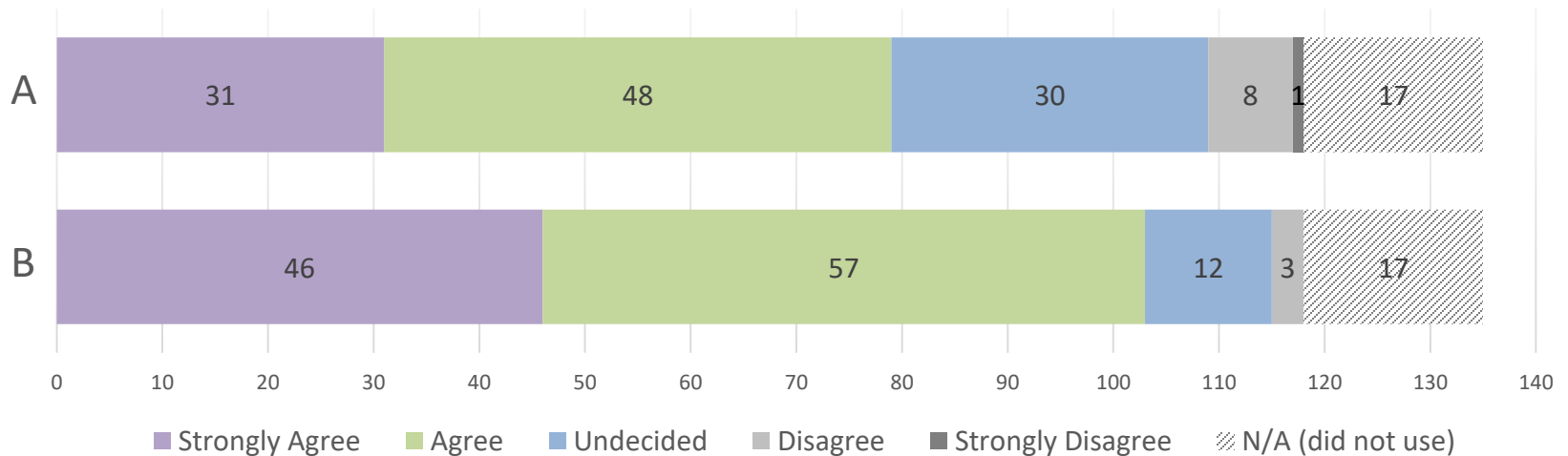
Results

- A. I believe the **presentations and discussions** of the **case studies** helped me to **remember** information about the diseases, health concepts, interventions, and social impacts that were described.
- B. I believe the **presentations and discussions** of the **case studies** helped me to **understand** information about the diseases, health concepts, interventions, and social impacts that were described.



Results

- A. I believe my **participation** in the discussions of the case studies was **increased** by using the **Poll Everywhere** response system.
- B. The **Poll Everywhere** response system was **easy to use**.



Conclusions

SAS 13

Majority of respondents indicated the **case studies** were **excellent** or **good** at helping them to **think critically** (n=124; **92%**)



Majority of respondents indicated the **quizzes** were **excellent** or **good** at helping them to think critically (n=115; **85%**) (not quite as enthusiastic)



Majority of respondents **strongly agreed** or **agreed** that the case studies helped them to **remember** and **understand** information/concepts (n=128; **95%**)



This was also frequently mentioned in the written responses.

Conclusions



SAS 13

Majority of respondents **strongly agreed** or **agreed** that use of **Poll Everywhere** increased their **participation** in the discussions of the case studies (n=79; **59%**),



Some were **neutral**, **disagreed**, or **strongly disagreed** (n=39; **29%**) and some **did not use** (n=17; **13%**)

The majority of respondents **agreed** or **strongly agreed** that Poll Everywhere was **easy to use** (n=103; **76%**)





My observations and opinions



Student participation in answering questions was definitely increased by using Poll Everywhere (particularly in large class)

Poll Everywhere is easier to use (for short-answer questions) in a smaller classroom
More time for all student answers to be displayed

Scrolling text wall works the best for displaying short answers most efficiently in a large class

Highest speed still gives plenty of time for students to read
Smaller font size allows more answers to be displayed at once



Word clouds look cool but only make sense with one word answers—not really that different than multiple choice

Poll Everywhere has recently upgraded their display options (it is more readable/appealing)