

Title:

Finding a Cure to Diabetes

LESSON 3

Subject area/discipline: Interdisciplinary

Grade level: 7-12

Suggested time:

Synchronously (on-line or face-to-face): 180 minutes

Asynchronously: 180 minutes

OVERARCHING CRITICAL INQUIRY QUESTION:

What are the most essential attributes for ground-breaking scientists who impact the future in positive ways?

OVERARCHING CRITICAL INQUIRY TASK:

Tell a compelling story of the discovery of insulin in a way that can inspire powerful future actions to a selected audience using the most appropriate medium.

Lesson critical inquiry question

What are the most compelling arguments for prioritizing a cure for diabetes over other medical research objectives?

Lesson critical inquiry task

Construct a compelling argument for a specific audience as to why they should support research into a cure for diabetes.

Central ideas/learning goals

- Each discipline explores the issue of diabetes through different perspectives and interprets evidence in different ways
- There are compelling demands for many competing medical research priorities, including a cure for diabetes
- Diabetes research has helped improve lives for many
- The occurrence of diabetes varies within the population

Related concepts

- Prospective thinking
- Transdisciplinary thinking
- Argument
- Compelling

Key competencies

- Read, analyse, and synthesize information about diabetes from the perspectives of various disciplines
- Construct a compelling argument
- Communicate arguments clearly and persuasively
- Thinking prospectively

Lesson overview

In this lesson, students are introduced to both transdisciplinary thinking and prospective thinking. They will be asked to use evidence considered from a variety of subject disciplines to construct a compelling argument for why research into a cure for diabetes should be considered a priority. Students will first construct a series of simple arguments focused on evidence considered from individual subject areas. They will then construct a complex argument by considering the intersections between the collection of simple arguments.

Materials and preparation required

- [Appendix 1: Arguments for Wearing Face Masks](#)
- [Appendix 2: How to use P.E.A.S. to create simple arguments](#)
- [Appendix 3: Framing Simple Arguments Using P.E.A.S.](#)
- [Appendix 4: Developing a Complex and Compelling Argument](#)
- [Subject Fact Sheets](#)

Opportunities for Differentiation

- Consider limiting the number of disciplines students work with based on their grade, curriculum alignment and background in the various subject areas
- When building a compelling argument limit the number of supporting arguments to 2 or 3 for students who may need extra time
- Allow students to present their compelling argument in an oral presentation, a Flipgrid video or other means that is comfortable for them

Launch the learning

Ask students which two of the following arguments they would use if they were trying to convince someone to support research for a cure to diabetes in 3 minutes or less:

Sample items

1. The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014.
2. People with diabetes must monitor what they eat and should limit the amount of soda, sweets, desserts, and other foods that are made primarily of processed sugar they consume.
3. It is estimated that diabetes causes 3.8 million deaths every year.
4. Health systems around the world spend \$465 billion annually fighting the disease.
5. The global rates of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014.

Source: World Health Organization, <https://www.who.int/news-room/fact-sheets/detail/diabetes>

Set the task

Inform students that nearly \$300 billion a year is spent on medical research.

Deciding where to spend the money and on what to focus the research is a decision that we all participate in. Different levels of Government, corporations, research institutes and universities share in a complex decision-making process to determine how much funding to provide for research into a wide variety of medical issues. Sometimes, these decisions are the function of emerging public health crises (ie) like COVID-19, and sometimes the decisions are made through large donations from public and/or private contributors. National and international organizations like the WHO and other non-governmental organizations also play a role in the decision-making, especially during times of global pandemics or health emergencies. And, of course, at an individual level, our advocacy in support of different areas of medical research through charitable donations or volunteer work play a big role in determining the focus of research.

When making difficult decisions around where to focus medical research efforts, many factors must be taken into account. Inform students that they will be constructing a compelling argument for research into a cure of diabetes being a top priority. To build their argument they will be considering evidence from the perspective of a variety of subject disciplines.

Share/construct criteria for a compelling argument

1. Present students with three sample arguments around wearing face masks ([Appendix 1: Arguments for Wearing Face Masks](#))
2. Ask that they read each of the arguments and then rank them from the most to least compelling. Invite students to share what they were thinking to help them do their ranking. For example, what did they consider as they were deciding that one argument is more compelling than the others? Do not have students share their actual rankings as they will be more focused on the answer rather than the thinking to surface the criteria. For some students you may want to ask them to focus on the most and least compelling arguments only, explaining why one is clearly more compelling than the other.
3. After students have ranked and explained their decision, encourage them to review the arguments presented by their peers. Ask that each student select at least one statement made by a peer that was effective at getting them to re-consider their ranking or provided a different argument than they had thought of that supports their ranking.
4. Invite students to share what they believe were the key features of a compelling argument.
5. Point out to students that a key difference between a “strong” argument and a “compelling” argument is that a compelling argument is designed to encourage others to act.
6. Present students with the following set of criteria for a compelling argument and ask them to decide which 3-4 criteria should be kept and/or if any other criteria should be added?

Criteria for a compelling argument:

- Focused on a coherent meaningful purpose that promotes prospective thinking
- Based on the most significant relevant and reliable evidence from a variety of disciplines
- Built on insights that consider the evidence from a variety of discipline-based perspectives
- Sets out a clear general/broad action (e.g. global mandate for ...; prioritize the allocation of resources in support of...; finding a cure for diabetes etc.) supported by a range of possible supporting actions (dedicated lab space in key locations; strategic funding proposal etc.)
- Makes effective use of powerful language to support the driving claim (strong words such as essential, imperative, vital...etc.)
- Ensures the purpose, evidence and action support each other and do not change throughout the argument

Build background knowledge through a variety of disciplines

1. Present evidence from up to 6 different disciplines related to diabetes (have students source their own data, or use the provided fact sheets). Students working in pairs/groups examine the evidence from each discipline to extract evidence, or trends and patterns, that are important. Groups share what they have been able to extract from the various bodies of evidence by posting their lists, on the wall in the classroom, or online.

Questions to focus the examination of the evidence:

Math: Questions Mathematicians would ask...

- What trends or patterns do you see?
- How consistent are these trends?
- Can predictions be made using these trends?

Science: Questions Scientists would ask...

- Does diabetes affect quality of life and longevity?
- Does diabetes cause other ailments or complications?
- How life threatening is diabetes?
- Genetic or epigenetic?

History: Questions Historians would ask...

- Has the prevalence of diabetes changed over time?
- Have attitudes towards diabetes change over time?
- Which societal changes have had a significant impact on increasing or decreasing the growth of diabetes?
- Which factors may explain higher or lower rates of diabetes in different regions of the Canada?

Sociology: Questions sociologists would ask...

- Does diabetes significantly impact people's ability to take part in leisure activities?
- Does diabetes significantly impact on personal relationships?
- Does diabetes impact on families? How does it impact on parents and siblings?
- Does diabetes impact on people's happiness and sense of well-being?

Economics: Questions Economists would ask...

- What is the demand for diabetes treatments and medications?
- Is there sufficient supply of medications, treatments, technologies...?
- How does diabetes affect productivity and number of sick days taken?
- How much government expenditure is currently used to support diabetes research relative to other illnesses?

Geography: Questions Geographers would ask...

- Is diabetes more prevalent in certain areas in the world, countries, provinces, cities?
- Are there any important patterns or trends evident in this distribution (more cases of diabetes in developed or developing countries?)
- Are some racial groups more likely to develop diabetes?

Introduce thinking strategy to help build a compelling argument

1. Present students with [Appendix 2: P.E.A.S.](#) Distinguish for students the difference between simple arguments and complex arguments. Simple arguments are focused on a single idea or perspective; a complex argument is constructed through the careful weaving together of several simple arguments so that it makes a strong case for action through the connections between related disciplinary perspectives. Both simple and complex arguments can and should be compelling.
2. Review the samples to help students understand how the thinking strategy can be helpful in building arguments. Ask students to practice by completing the empty cells for the final two examples. If time permits, ask students to generate one or two additional samples with each cell completed. Once students have a clear understanding of how to use P.E.A.S., provide them with [Appendix 3: Framing Simple Arguments Using P.E.A.S.](#)
3. Ask that they work in pairs/groups to use the evidence gathered from the various subject areas to construct a set of simple and compelling arguments using the P.E.A.S. format.

Share draft arguments

1. Invite the student pairs/groups to share the simple arguments they have constructed by posting them online or on the walls of the classroom. Encourage each student to review at least three sets of simple arguments by commenting on their strengths and making helpful suggestions to improve the arguments.

Introduce “Prospective” Thinking

1. Introduce the concept of prospective thinking by presenting the following definition:

Prospective thinking is future-oriented. Prospective thinkers look at past and current events to identify trends and patterns they can use to plan for positively impacting the future

2. Ask students to review the three arguments for face masks (Appendix 1). Inform them that two of the three arguments contain a prospective element. Ask that they identify the arguments that contain a prospective element and that they underline the relevant section. For the argument that does not contain a prospective element invite students to edit the argument so that it also contains a prospective element.
3. Encourage students to share their revision through a class discussion or by posting online.
4. Review the criteria for a compelling argument and ask students “Which of the criteria is most affected by prospective thinking?”

Criteria for a compelling argument

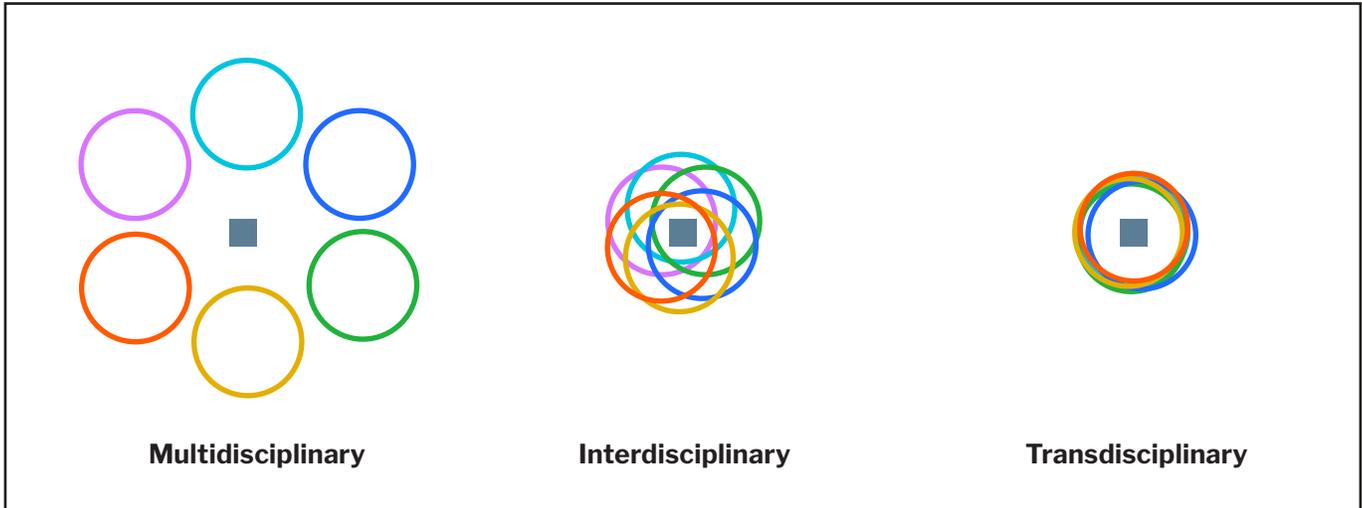
- a. has a clear purpose
- b. is based on relevant and reliable evidence;
- c. motivates people to take action;
- d. makes effective use of language to support a claim (e.g. strong words such essential, imperative, vital...);
- e. ensures the purpose, evidence and action support each other and do not change throughout the argument

Revise and polish compelling argument

1. Encourage students to revise their simple arguments considering where there are opportunities to add a prospective thinking element. Also encourage students to reflect on the strengths of the arguments they reviewed and the comments made by their peers about their draft arguments.
2. Allow students time to make revisions to their set of arguments that:
 - a. Improve clarity, and/or
 - b. Adds a prospective element, and/or
 - c. Strengthens the argument, and/or
 - d. Makes more effective use of evidence.

Construct a Complex Argument

1. Introduce students to “transdisciplinary” thinking by sharing the following image:



2. Invite students to describe in words what each of the images convey about the differences between the terms multidisciplinary, interdisciplinary and transdisciplinary. Help them to see that multidisciplinary refers to considering evidence from a variety of disciplines around a common issue; interdisciplinary refers to looking for the intersections of a variety of disciplines as they relate to a common issue; and transdisciplinary refers to combining evidence from a variety of disciplines to create a new more holistic argument.
3. Ask students to use the collection of simple arguments they created through the consideration of evidence from a variety of disciplines to construct a coherent compelling argument. Inform them that this will require developing a central argument or thesis statement around which the simple arguments can be organized to construct the complex, compelling argument.
4. Provide students with a copy of [Appendix 4: Developing a Complex Argument](#) and ask that they use the arguments they have developed to construct a complex, compelling argument for the search for a cure to diabetes being a top priority in the field of medical research.

Connect to the Story of Insulin

1. Invite students to return to the story of the discovery of insulin they have been developing and ask students to adding a complex compelling argument with a strong prospective element for making the search for a cure to diabetes a top priority in medical research. Remind students to connect their case for the search for a cure to their broader story in a way that extends the story beyond they initial discovery and distribution.