Lesson One

Why study type 2 diabetes?

Overview

This lesson begins with an introduction to the themes explored in the unit through student participation in a *Silent Chalk Talk* conversation. Students are then introduced to diabetes through a CDC power point that shows how the prevalence of diabetes has increased dramatically in the Unites States between 1994 and 2010. Students are challenged to consider how to make a difference in the tremendous growth of this disease in the last 16 years. By asking questions and reviewing data, students are introduced to different types of diabetes, risk factors, treatment and prevention options in order to decide which type is the most common and the most preventable.

Enduring understandings:

- Type 2 diabetes, as with most traits, is determined by both genes and the environment.
- The increase in type 2 diabetes nationally and globally appears to be associated with an increase in obesity, changes in diet to highly processed foods, and decrease in physical activity, as well as other factors.

Essential question:

What is type 2 diabetes and why is it important?

Learning objectives:

Students will be able to:

- Know that type 2 diabetes is an important public health focus in the U.S., due to its prevalence and rapid growth.
- Develop relevant questions based on data and discussion.
- Interpret data.

Time: 90 minutes

This lesson connects to the Next Generation Science Standards in the following ways:

Performance Expectation

HS LS3-3 Apply concepts of probability to explain the variation and distribution of expressed traits in a population.

HS ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

The lesson highlights the Scientific Practice of **Constructing Explanations and Designing Solutions:** *Design, evaluate and refine a solution to a complex, real-world problem*.

It also highlights **Asking Questions** and **Interpreting Data,** and the Crosscutting Concepts of **Patterns** and **Stability and Change**.

Materials

Materials	Quantity
Chalk Talk poster instructions	1 per class
Chalk Talk Rules of Participation	1 per class
Large pieces of butcher paper or easel pad paper for Chalk Talk	6 per class
Colored markers for writing on Chalk Talk posters (3 x 6 posters)	18
Computer and projector	1 per class
PowerPoint presentation for Lesson 1, found at http://gsoutreach.gs.washington.edu/ (see GEM Instructional Materials)	1 per class
Student Sheet 1: *Why Study Diabetes?* (two-sided)	1 per student
Computers for students	1 per student or group
Access to reliable Type 2 Diabetes websites such as the following American Diabetes Association: http://www.diabetes.org/diabetes-basics/type-2/ Mayo Clinic: Type 2 Diabetes: http://www.mayoclinic.com/health/type-2-diabetes/DS00585 PubMed Health: Type 2 Diabetes: http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001356/ Center for Disease Control (CDC): http://www.nccd.cdc.gov/ddtstrs/FactSheet.aspx Health Outcomes County by County: http://www.countyhealthrankings.org	
Map showing distribution of type 2 diabetes in the US by county http://www.cdc.gov/diabetes/atlas/countydata/atlas.html	

Lesson Preparation

- Create the Chalk Talk posters as instructed and place three markers by each poster.
- Reserve the computer lab or make sure that your students have access to computers in class.
- Make sure that the PowerPoint presentation for lesson one including the slides *Diagnosed Diabetes in US Adults-1994-2010* and *Types of Diabetes* is loaded on your computer and ready to be projected to the class.

Presenting the Unit
Part 1 (Engage): **Silent Chalk Talk** (*15 minutes*)

Teacher Background: In Silent Chalk Talk, students explore and share their thoughts and ideas about how genes and the environment both influence Type 2 Diabetes by silently responding in writing to statements, questions and pictures posted on the classroom walls. The goal for this written (silent) conversation is that all students are given an equal voice, remarks are as anonymous as possible, and students feel safe to express their thoughts and feelings. Through the posters, students will get a sense of the breadth of topics about diabetes this curriculum will address. The posters should remain up around the room for the duration of the unit. Students will get a chance to add to the posters in subsequent lessons, allowing for an evolution of thought.

Create the posters from the Teacher Resource--*Silent Chalk Talk Posters* using large blocks of butcher paper or easel pads. Be sure to leave enough space for students to add their comments over three to four days. If possible, use one color of marker per poster for each day. By doing so, student comments will be more anonymous and different colors will show whether a comment was written early in the unit or later in the unit.

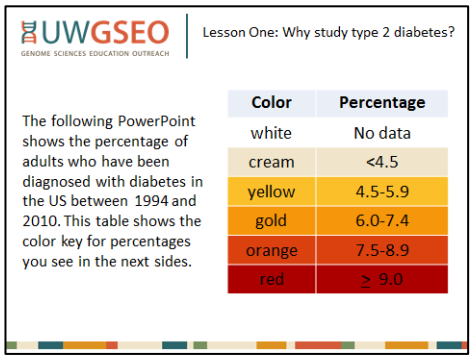
Instructions:

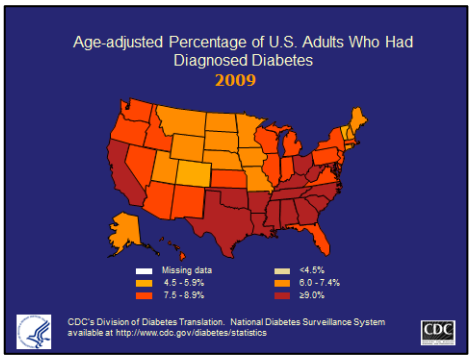
1. Tell students that the class is beginning a unit that explores how both genes and the environment influence our health, and the focus of the unit will be on type 2 diabetes.
2. Show students the six posters placed around the room. Each explores a different aspect of type 2 diabetes, including social factors that contribute to the condition.
3. Before letting the students respond, read through each poster with students and ask for clarifying questions. Be careful to not discuss any opinion or give any information that may change students' responses. Merely ensure that they understand what the questions or statement is addressing. It is important to leave this as vague as possible to allow for students to identify their own preconceived notions and/or misconceptions and to allow for evolution of thought throughout the lessons.
4. Post and review rules of participation in a silent chalk talk from Teacher Resource -- *Silent Chalk Talk Rules of Participation.*
5. Give students 10 minutes to contribute to each poster at least once, either by responding to the primary comment on the poster, or responding to other students' comments.
6. Explain to students that they will be using these posters to continue a conversation over the next few days but are not to discuss it outside of class.

Part 2 (Engage): Diabetes over Time (PPT Presentation; *15 minutes*)

7. Show the PowerPoint, Diagnosed Diabetes in US Adults-1994-2010, which maps the prevalence of type 2 diabetes (t2d) in the United States from 1994-2010. The map is color-coded to indicate the percent prevalence state by state and year by year.

Slide 2 through Slide 19





8. Show the PowerPoint at least three times (by restarting at Slide 3) so that students can absorb the information.

9. Ask the class to brainstorm questions that come up for them as they watch the slide show. Write these questions down on a Question Wall--an area that allows the class to refer back to them throughout the unit.

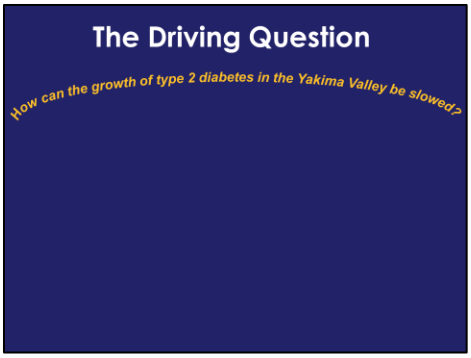
10. Tell students that the Driving Question for this unit will be:

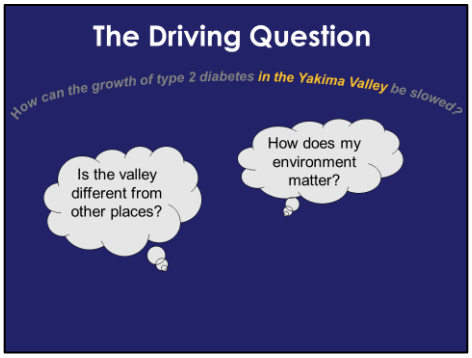
    How can the growth of type 2 diabetes in the Yakima Valley be slowed?

11. Link any questions that the class has already written on the Question Wall back to this question. For example, learning the answers to many of those questions will also lead to the answer to the Driving Question. To fully answer the Driving Question, students will need to know what causes diabetes, what slows or speeds up the condition, and what elements in their local community environment play a part in the acquisition of the disease. Slides 20 – 24 can be used to tie the Driving Question to questions the students have asked.

Note: This curriculum was developed for and piloted by teachers in the Yakima Valley of Washington State. Students should, understandably, research their own communities so that they may be able to learn about local conditions and issues, and potentially address these in their Call to Action products.

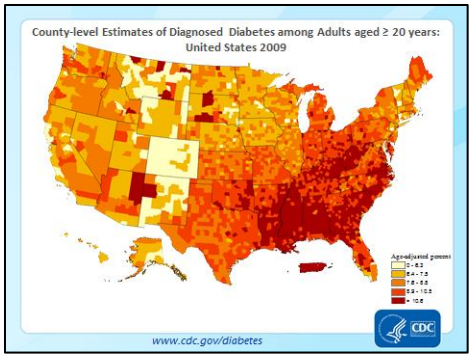
Slide 20 - 24





12. In order to see the ***local connection*** to this nationwide growth, have students view the statistics from their own county by going to the following web page and choosing their state from the dropdown menu near the bottom of the page. It is also possible to see the statistics from earlier years. By choosing the "indicator" dropdown menu near the top of the page, you can also see the county statistics about obesity and physical inactivity.

Slide 25



Another helpful county-by-county resource can be found here: http://www.countyhealthrankings.org

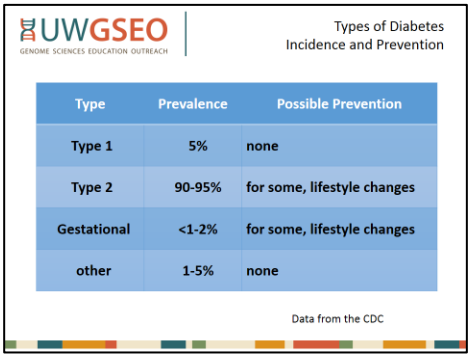
http://www.cdc.gov/diabetes/atlas/countydata/atlas.html

Part 3 (Explore): **Types of Diabetes** *(10 minutes)*

13. After considering the data individually and in pairs, ask students share their ideas about what the data indicate.

14. Show Slide 26 to raise the issue that the data include different types of diabetes, and that it is important to understand the differences for scientific study.

Slide 26



15. Ask students what they know about type 1 and type 2 diabetes, gestational diabetes and the other more general category. You may have to provide some of the background information given in the teacher notes, either as a short reading or direct instruction, to stimulate conversation.

16. Ask students which type of diabetes should be the focus if they want to make a difference in the trend of prevalence in the country. (They should point out that type 2 diabetes is the biggest category and is preventable for some people, so a focus on t2d has the potential to reverse the trend.)

17. Ask students to share what they know about type 2 diabetes.

Part 4 (Elaborate): Going Deeper (*20 minutes*)

18. Provide each student group (3-4 students/group) with access to a computer. Ask them to look for answers to their questions and to write 6-8 advanced questions and ideas that the additional data elicit.

19. Discuss what students learned about their initial questions and have them pose additional questions. What do they know now? What more would they like to learn? Below are a few examples of more sophisticated questions and ideas students may raise after examining the data:

    - What is it about certain parts of the country/world that leads to increased incidence?
    - What changes have occurred worldwide to result in changes in type 2 diabetes incidence?
    - Does the evidence that type 2 diabetes runs in families reflect genetics, culture, society, or all three?
    - Why do some people get type 2 diabetes and others do not?

20. Do not focus on answering the questions, but continue to collect the questions or write a few common questions on the Question Wall.

Closure (Evaluate) *(10 minutes)*

21. Revisit the driving question for the unit:

    How can the growth of type 2 diabetes in the Yakima Valley be slowed?

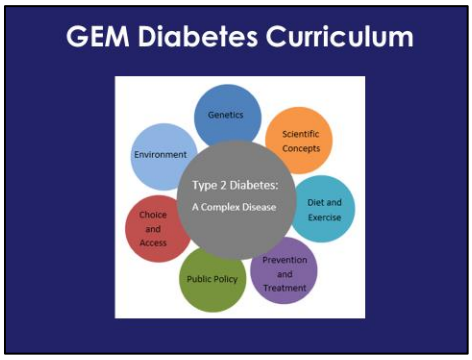
    Have students discuss how what they have just learned helps them answer the question.

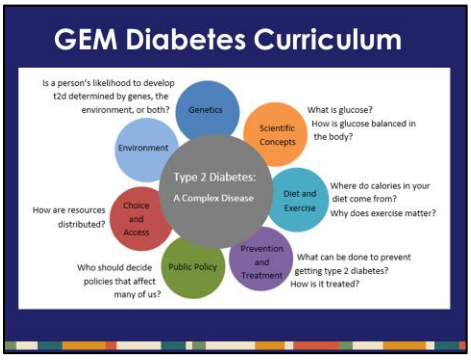
22. Conclude the class by introducing the 'Call to Action' product. Students will be asked to show what they have learned throughout the unit in a way that interests them and answers their unique questions. Products should show that scientific findings

related to type 2 diabetes can be translated into actions on the personal, community, public health policy, and political levels to improve human health.

23. To support students in thinking about their Call to Action products, show slides 27 and 28. These slides give a preview of the entire curriculum so that students can see what topics will be addressed in the next days and weeks. Students can then begin to think about the types of questions that most interest them.

    Slides 27 - 28





24. Ask students to complete Question 9 on Student Sheet 1 to encourage them to begin thinking about their Call to Action product. In the end, a Call to Action product will:
    - Show an understanding of problem(s) associated with type 2 diabetes
    - Contribute to a solution for a problem
    - Have direct and meaningful impact on diabetes in the community (which could include individuals, families, schools, and/or the wider community)
    - Contain accurate information.

25. If time allows, students can sort themselves into groups based on preliminary topic interests.

26. Teachers may choose to share the Grading Rubric for the Call the Action products at this time, which can be found in the Call to Action portion of the curriculum on page 140. This section also contains student worksheets, planning forms, and other resources to support students in their Call to Action products.

Name: _____ **Date:** _____ **Period:** _____

Student Sheet 1: Why Study Diabetes?

1. With your class, watch the PowerPoint presentation, Diagnosed Diabetes in US Adults-1994-2010. The table below gives the color key for percentages.

Color	Percentage	Color	Percentage
white	No data	gold	6.0-7.4
cream	<4.5	orange	7.5-8.9
yellow	4.5-5.9	red	≥ 9.0

2. What do the data in this PowerPoint show you in terms of prevalence of diabetes in the United States from 1994-2010? Answer this question by yourself, then discuss with a partner and with the whole class.

3. See Slide 25, Types of Diabetes.

4. Based on the data in the PowerPoint, what type of diabetes would make most sense for public health policies and education to focus on? Why?

5. What do you know about this type of diabetes based on your prior knowledge?

6. a. Write 3-5 initial questions about what you would like to learn about this type of diabetes.

   b. After your class discusses this topic, write down additional questions that were not on your list.

Page 2 What do you want to know about type 2 diabetes?

Answer the questions below:

7. Working in a team of 3-4 students, use the online resources below to answer some questions on your class master list on a separate sheet of paper.

   American Diabetes Association: http://www.diabetes.org/diabetes-basics/type-2/
   Mayo Clinic: Type 2 Diabetes: http://www.mayoclinic.com/health/type-2-diabetes/DS00585
   PubMed Health: Type 2 Diabetes: http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001356/
   Center for Disease Control (CDC): http://www.nccd.cdc.gov/ddtstrs/FactSheet.aspx
   Health Outcomes County by County: http://www.countyhealthrankings.org

8. Write 8-10 questions and ideas that you would like to investigate in more depth based on your exploration of the data package.

9. Call to Action: Highlight two of your team questions from Question 8, and explain how those questions could form the basis of a Call to Action by answering the following for each question:

   a. What is the issue or problem addressed by this question?

   b. Who is affected by this issue or problem?

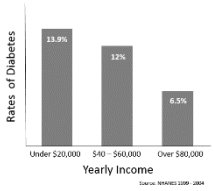
   c. What could be done by individuals, families, communities, health agencies, or others to provide a solution to this problem?

10. Homework: Why is glucose important in type 2 diabetes?

Teacher Resource

Silent Chalk Talk Posters

Re-create these posters on large pieces of butcher paper or sticky notes. If possible, provide a different color marker each day students respond to the prompts.

Glucose is…	**I think developing type 2 diabetes is due mostly to:** **Genes** ⟷ **Environment**	**What does this graph mean to you?**  (See teacher resource for copy master)
Type 2 diabetes can be prevented or controlled by…	**Why study diabetes?**	I know **A LOT** about this topic **I have NO personal connection** ⟷ **I have MANY personal connections** I know **LITTLE** about this topic (Have students plot their own position/knowledge point using a different class color each day.)

Silent Chalk Talk Rules of Participation

1. Respond to the main comment anywhere on the poster.
2. Respond to others by drawing an arrow from their comment to yours.
3. If you agree with a comment, add an ! or ★.
4. If you disagree with something, politely explain why.
5. Do not cross out or write over anyone else's comments.
6. Pictures are permissible, just keep them appropriate.
7. Keep all responses respectful.
8. No Talking.

Instructions: Print this graph and attach it to one of the Chalk Talk posters.