CIS: ***How Pig Guts Became the Next Bright Hope for Regenerating Human Limbs***

**Benchmarks:** Carefully select text that aligns with State Standards/Benchmarks

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| **Title of Text/Article:** | *How Pig Guts Became the Next Bright Hope for Regenerating Human Limbs*, By Adam Piore |
| **CTE Standards:** | **Agriculture:**  **Agriscience Foundations 1:**  01.01 Investigate the origin and history of agriculture and its relationship to science and technology.  01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.  03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).  06.01 Explain the economic importance of animals and the products obtained from animals.  06.06 Compare and contrast animal welfare issues.  06.07 Investigate the nature and properties of food, fiber, and by-products from animals.  **Animal Science and Services**  10.01Describe animal science and the role of animals in society.  17.04 Explain the implications of animal welfare and animal rights for animal agriculture.  **Veterinary Assisting 4**  34.01 Define animal welfare and animal rights.  34.02 Compare and contrast between animal welfare and animal rights.  34.04 Debate current events concerning animal welfare and animal rights.  **Health Science:**  **Principles of Biomedical Science**  02.06 Differentiate between legal and ethical issues in healthcare.  02.08 Evaluate and justify decisions based on ethical reasoning.  03.01 Identify the major body systems and their functions. Understand that these systems work together to maintain good health.  03.02 Identify and locate specific organs that comprise the six major human body systems.  03.03 Describe the structure and function of each of these organs.  03.04 Recognize that organs are composed to specific types of tissues, which are composed of specific cells that operate both independently and interdependently of each other. |
| **NGSSS for Science Benchmarks:** | **HE.912.C.1.8** Analyze strategies for prevention, detection, and treatment of communicable and chronic diseases.  **SC.912.L.16.10** Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues. |
| **CCSS ELA & Literacy in History/Social Studies, Science, and Technical Subjects** | **LACC.910.RST.1.1** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  **LACC.910.RST.2.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to texts and topics.  **LACC.910.WHST.3.9** Draw evidence from informational texts to support analysis, reflection, and research. |
| **Mathematical Practices** | **MACC.K12.MP.1:** Make sense of problems and persevere in solving them.  **MACC.K12.MP.2**: Reason abstractly and quantitatively.  **MACC.K12.MP.3**: Construct viable arguments and critique the reasoning of others.  **MACC.K12.MP.7:** Look for and make use of structure.  **MACC.K12.MP.8:** Look for and express regularity in repeated reasoning. |

**Teacher Notes:**

* Materials:
  + Text or article (of sufficient complexity to promote high-level thinking)
  + Sticky notes (for opening “hook question, question generation, written responses, etc.)
  + Markers, rubrics (for Text-Based Discussion, Student Written Responses, Question Generation, etc.)
  + Student copies of worksheets (for Written Responses, Direct Note-Taking, and Question Generation).
* Preparations:
  + Number paragraphs of selected text/article for ease of locating text evidence during discussions.
  + Develop and display Final/Complex Text-Based Question at the beginning of the lesson to communicate upfront for students the lesson’s final question and learning outcome.
  + Text-marking: Develop and display a code system appropriate for the CIS text to use in text-marking. Select a small text segment and preplan corresponding coding example(s) to model the text-marking process for students.
  + Directed Note-taking: Develop a graphic organizer with headings appropriate for the CIS text. Select a small text segment and preplan corresponding note(s) to model the note-taking process.
  + Question Generation: Select a small text segment and preplan a corresponding question(s) to model the Question Generation process for students.
  + Any audio visuals, specimens, and/or samples to enhance lesson.
* Guidelines:
  + Add additional efferent discussion sessions, as needed.
  + The C.I.S. Model can last 3 days or longer. (Short texts can take less time; long texts, more time)
  + Schedule a C.I.S .lesson periodically (approximately every 3-4 weeks).

## \* \* \* CIS Step 1 \* \* \*

**Tasks:** Teacher asks hook question to launch opening discussion, reads aloud to students while students mark text, students read the text and participate in directed note-taking.

**Purpose:** To bring world relevance to text reading, establish a purpose for reading, model fluent reading, provide opportunities for students to become interactive with the text, and think critically about information in the text.

**Visual Hook**: Piore, Adam. (2011 July-August). *How Pig Guts Became the Next Bright Hope for Regenerating Human Limbs*. Retrieved from <http://discovermagazine.com/2011/jul-aug/13-how-pig-guts-became-hope-regenerating-human-limbs>

**Hook Question:** What are ethics and why should ethics be considered when making personal decisions?

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| **Predictive Written Response to Complex Text-Based Question:** What are some positive and negative consequences of research in the field of biotechnology and medicine? |
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**Vocabulary Instruction**

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| **Para-graph #** | **Academic or Discipline Specific Vocabulary** | **Word Part or Context** | **Para-graph #** | **Academic or Discipline Specific Vocabulary** | **Word Part or Context** |
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* Direct students to locate words introduced in the text by paragraph number.
* Model for students how to derive word meaning(s) from word parts (prefix, root, suffix) and/or context. Record meanings of word parts and words on chart paper.
* Variations for Vocabulary Instruction:
  + record meanings of word parts and words in word study guide, journal writing, graphic organizers, etc.
  + post word parts, words, and their meanings on a vocabulary word wall; refer to word wall during reading, discussions, and writing throughout CIS lesson and subsequent lessons.

## Reading #1

**Text-marking**

P – this section of text shows \_\_\_\_Positive Impact\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

N – this section of text shows \_\_\_\_Negative Impact\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D – this section of text shows \_\_\_\_New Discovery\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Model for students by reading the text aloud and coding a portion of the text. Students follow along and mark their copy. Students proceed to code the rest of the text independently. Students share text markings with table group or partner.

## Reading #2

**Directed Note-Taking** - Record notes containing the most important information relevant to the guiding question

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| **Directed Note Taking: *How Pig Guts Became the Next Bright Hope for Regenerating Human Limbs*** | | | | | |
| **Guiding Question*:*** *Using evidence from the text, why is it important to consider positive and negative impacts on society, including ethics, in scientific research prior to conducting scientific research?* | | | | | |
| **Para-**  **graph #** | **NOTES** | **Check relevant categories below** | | | |
| **+ Impact Society or Individual** | **- Impact Society or Individual** | **Ethical issues** | **New discovery** |
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* Present a guiding question to direct students thinking while taking notes. Teacher models note-taking using an example statement from the text, then selecting the category or categories that support the statement. Students complete note-taking collaboratively or independently.
* Conduct small- and whole-group efferent discussion. Ask groups to come to consensus on which category is the most impactful according to the support from the text.

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| **First Draft Written Response to Essential Question**  *Using evidence from the text, why is it important to consider positive and negative impacts on society, including ethics, in scientific research prior to conducting scientific research?* |
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* Ask students to complete the second Written Response.
* Variations for this Written Response: Sticky notes quick writes, collaborative partners, written conversations

## \* \* \* CIS Step 2 \* \* \*

**Tasks:** Teacher models the generation of a complex question based on a section of text, relating to a broad perspective or issue. Students record the questions, and then students re-read the text to generate their own questions.

**Purpose:** To provide students with a demonstration of question generation and the opportunity for them to interact with the text by generating questions to further deepen their comprehension.

## Reading #3

**Question Generation**

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| **Question Generation: *How Pig Guts Became the Next Bright Hope for Regenerating Human Limbs*** | | | | | |
| **Para-**  **graph #** | **Questions** | **Check relevant categories below** | | | |
| **+ Impact Society** | **- Impact Society** | **Ethical issues** | **New discovery** |
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* Teacher models re-reading a portion of the text and generates one or two questions.
* Students continue to review/scan the text and use their recorded notes to generate questions about information in the text collaboratively or independently.
* To conclude question generation, the teacher has students:
  + share their questions with the related category whole class and discuss which questions they have in common, and which questions are most relevant or significant to their learning.
  + record/post common and relevant/significant questions to encourage:
* extended efferent text discussion
* students to seek/locate answers in text-reading throughout the remainder of the chapter/unit focusing on unanswered questions in collaborative inquiry.

## \* \* \* CIS Step 3 \* \* \*

**Task:** Teacher posts a Complex Text-Based question, students discuss answers, and review/revise answers to the final/Complex Text-Based question based on discussion.

**Purpose:** To provide opportunities for students to interact with the text and with their peers to:

* identify text information most significant to the final/essential question.
* facilitate complex thinking and deep comprehension of text.

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| **Final Written Response to Complex Text-Based Question**  *According to the text and extended text discussion, which factor is most likely the primary concern when conducting scientific research for new discoveries?* |
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* The Final Written Response can be used as an assessment for student learning, aligning to FCAT Item Specifications.