Institute for the Study of
KNOWLEDGE MANAGEMENT IN EDUCATION

UNIT TEMPLATE: Text-Based STEM Inquiry

This template provides an approach for creating a science investigation that includes reading-focused inquiry to build student science literacy skills. The template was created to support library media specialists and STEM teacher cohorts in year two of the *School Librarians Advancing STEM Learning* project, led by the Institute for the Study of Knowledge Management (ISKME) in partnership with Granite State University, New Hampshire, and funded by the Institute for Museum and Library Services (IMLS).

Part I: Unit Title: (insert your title here)

Part II: Background on LMS and Science Teacher relationship: This lesson was created by Library Media Teacher (librarian name - Letha) and (Biology) teacher (teacher name - Joanna). Letha's strengths were identified as text-based inquiry and she requested to see Joanna model science lab inquiry. Joanna's strengths were science content knowledge and she requested to see Letha model student research strategies supported by text-based inquiry.

Part III: Unit Description: This unit includes [___] lessons that culminate in *[example: students designing a scientific research proposal that examines the role of cellular organelles in diseases and treatment.]*.

Using inquiry-based reading, students will *[example: explore an anchor text and then develop their own essential and supporting questions to guide their research]*.

Over the course of the unit, students will *[example: explore a variety of texts and grow in their knowledge of cellular organelles and in their ability to use informational text to support their inquiry and research]*.

Part IV: Standards Addressed

- NGSS/State STEM Standards *(list standards you will address and assess, include text of the standard)*
- NGSS Crosscutting Concepts (consider either Patterns or Cause and Effect - Mechanism and Explanation)
- CCSS Science Literacy Standards *(list standards you will address and assess, include text of the standard)*

Part V: Unit Essential Question

Enter unit Essential Question here. Example: *Should cellular structures be an increased focus of funding in disease research?*

Part VI: Goals for Using Inquiry: The goal for using inquiry in this unit is to have students [*develop their own supporting research questions around cellular organelle function, examine provided text, select their own additional resources to use, and determine their own solution to the research question].* The science teacher and the library teacher have selected an anchor text about *[the role of mitochondria in disease]* and provided support for students [*in a set of texts that guide research around different organelles that contribute to disease.]*

Part VII: Summative Assessment Description and Rubric

Describe the culminating activity and summative assessment here. Note that the summative assessment should assess both science content and literacy skills.

Part VIII: Prior Knowledge Needed

This description should describe both science content and literacy skills.

Part IX: Student Learning Objectives

(Breakdown of the unit into discrete units of both science content and literacy skills. Examples follow:)

1) The student will be able to identify cellular structures by reading and annotating an article about cellular toxins.
2) The student will be able to analyze how cellular structures coordinate by applying information from the article about cellular toxins.
3) The student will be able to evaluate a claim that cellular toxins can be used as therapies for disease by using evidence from the text.
4) The student will be able to create a scientific research proposal by using textual evidence, data and precise details from the article to write write a grant proposal.

School Librarians Advancing STEM Learning, Granite State University, Concord, NH, February 2016. Funding provided by IMLS.

Part X: Text Set Description *(used by the teacher and media specialist as they analyze the purpose and goal of each text they provide to the students)*

Text Title & Hyperlink	Text Purpose (discuss complexity of the text along with its purpose/goal)	Text-Dependent Questions (created by the teacher/librarian to help students analyze the text in a specific sequence)	Accommodations for Diverse Learners
ABC Anchor Text	*This is my Anchor Text, designed to provide science content about cellular organelles while provoking student engagement around the essential question.* *This ATOS level of the text is an 11.27, which is appropriate for the middle of a 10th grade year. Linked here is the Qualitative Analysis of the Complexity.*	1. What question did the author seek to answer? 2. How did she go about her inquiry? 3. What is her primary claim? 4. Did she provide specific and useful evidence? 5. In your opinion, what is the strongest evidence provided?	1. Tier Two words will be chosen ahead of time and a definition will be added as footnotes to copies of the text. 2. Specific chunks will be chosen ahead to support students in breaking the reading down into manageable sections.
Supporting Text #1	{Optional qualitative and quantitative analysis}	1. Does this reading provide evidence that supports or contradicts information in the anchor text? How? 2. Which data table is most effective at communicating the data collected by the researchers?	
Supporting Text #2			
Supporting Text #3			

Part XI: Suggested Lesson Breakdown/Pacing

Day	Student Learning Objectives	Aligned Student Learning Task and Suggested Timing	Formative Assessment	Important Accommodations
Day 1: (90 minute block)	TSWBAT identify the functions of cell structures by reading an article about cellular toxins.	1. Students read the cellular toxin article on their own using annotation strategies given by the (teacher/LMS). 2. The (teacher/LMS) reads the article aloud, identifying important annotations. 3. Students are given a handout (linked here) to help them identify the cellular components and their functions that are listed in the article. 4. Students do a think-pair-share to write a sticky note with which cellular organelle was most clearly explained by the article.	1. The (teacher/LMS) will monitor students as they read independently to observe the number of annotations made. 2. The (teacher/LMS) will monitor student recording of teacher recommended annotations. 3. The (teacher/LMS) will monitor progress to see if certain areas of the assignment are confusing. The teacher will collect the handout and give feedback before the next class period. 4. The (teacher/LMS) will randomly choose sticky notes to read aloud, tracking trends and noticing gaps or misconceptions.	1. The (teacher/LMS) will provide the article ahead of time to students with high need. 2. The (teacher/LMS) will provide a list of defined vocabulary for the student to use during the 2nd reading. 3. 4.
Day 2: (90 minute block)				
Day 3: (90 minute block)				

Part XII: Attachment of Student Work Examples

Part XIII: Teacher and Librarian Reflection on the Implementation of the Lesson

YOUR NOTES:

Elevating School Librarians As Curriculum Creators and Collaborators

Amee Evans Godwin, April 13, 2016

All too often, the school librarian is an underutilized member of the team. As the use of digital content in school grows ever more connected to improved teaching and learning, school librarians must be tapped as experts in addressing digital information needs across their campuses. Moreover, librarians should be seen as key partners in curricular and instructional planning and implementation.

ISKME's work aims to elevate the potential of the school librarian role, especially in relation to open educational resources (OER). OER, openly licensed and shareable curricula, allow educators to use and reuse digital teaching and learning content without cost, without needing permission, and without needing to start from scratch.

ISKME's Program with School Librarians

Our education non-profit **is** pioneering a three-year training program for K-12 librarians and STEM teachers called the **School Librarians Advancing STEM Learning**. The goal is to activate the librarian as a co-planner and co-leader of open curriculum and shared instructional planning and classroom implementation. Together, the school librarians and STEM teachers in the training program are seeking to enhance their skills in using open educational resources. They are being introduced to OER as an essential vehicle for adapting and personalizing content for the needs of their own classrooms, to go beyond the textbook and to meet rigorous learning standards that foster student-led inquiry across the STEM disciplines.

The program aims to create new pathways and practices for STEM teachers to collaborate with librarians across subject areas by creating and adapting curriculum that engages their students in text-based inquiry, close reading, and deeper learning skills, including critical thinking and collaboration.

The training program's current cohort of 24 librarian and teacher fellows were introduced to open education principles and processes at the program's Professional Learning Academy, held in February 2016 at Granite State College in New Hampshire. Participants learned about resource collections and tools available in OER Commons, ISKME's digital library of open, freely available, resources developed over the past ten years. Participants from the same school formed small cohorts--composed of a librarian, and a science, technology or math teacher--and practiced design thinking and brainstorming exercises to generate essential questions to frame student inquiry and literacy activities.

After exploring examples of OER and STEM-literacy exemplars in OER Commons, STEM teacher and librarian participants are identifying informational texts and generating ideas for literacy-based curriculum to support student learning through close reading and text-based investigations in STEM inquiry. Their goal will be to create curriculum that guides students to engage with informational texts, and then share this curriculum openly with the school and the larger outside world, on OER Commons and through social media, such as blogs, videos, and tweets.

School Librarians Advancing STEM Learning, Granite State University, Concord, NH, February 2016. Funding provided by IMLS.

Throughout the spring and continuing into the fall, school librarians in the program will aim to co-develop innovative K-12 lessons, give each other feedback along the way, co-implement the lessons in the classroom, and extend their voice and outreach through presentations at their school and postings in social media—all of which add up to taking leadership roles around OER and curriculum and instructional improvement.

Rubric for School Librarianship

To guide the work of the project, a new rubric is being created. ISKME's Rubric for Learning and Practice will be an assessment tool to help school librarians as well as teachers build their understanding and skills. Specifically, school librarians will be expected to co-develop strategies and co-lead the development of student tasks that build literacy skills called for in the CCSS Science Literacy Standards, and actively incorporate open education practices.

For example, working with one or more STEM teachers in the training program, they will develop STEM curriculum with these components:

- a focus on essential questions,
- an informational text set for student close reading,
- text-dependent questions and student tasks focusing on students' ability to articulate text-based evidence and data in a STEM investigation,
- and students' ability to synthesize or present arguments to support the findings of the investigation.

In addition, school librarians will learn about the role of OER for curriculum improvement, meeting local instructional goals, and building collaboratively created cross-disciplinary curriculum. Taking a hands-on approach, participants will identify OER content and informational sources, curate collections of STEM sources and resources, and lead the design and creation of new high-quality OER for their school.

Are teachers, school librarians, and school leaders in your district and state working together already in this way? Join in on the hub at https://www.oercommons.org/hubs/imls to share your resources and reflections.

Led by ISKME, the project is a partnership with Granite State College, the New Hampshire Department of Education, New Hampshire's Institutes of Higher Education Network, and with endorsement and participation by American Library Association/American Association of School Librarians (ALA/AASL).
Support is provided by a grant from the Institute of Museum and Library Services (IMLS).

School Librarians Advancing STEM Learning

Expanding the role of K-12 school librarians as instructional leaders

https://www.oercommons.org/hubs/imls

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