**Literature-based Curriculum Development Assignment**

**Literature-based Curriculum Project:** (150 pts)

Each candidate will individually develop and present an integrated STEM education design challenge that is directly connected to a piece of children’s literature used in the elementary or middle grades (2 grade or above).

**Before getting started, confirm that your book selection and design challenge is an original idea. Please do not develop an activity that is commonly found in schools such as a foil/penny boat challenge, egg drop, 3 Little Pigs – blowing a structure with a hairdryer, or other common design challenge. If you can do a web search for the name of your book and design challenge (STEM challenge, engineering design challenge, etc.) and the idea can be found, it is not original. Additionally, if you use a resource, such as a science or mathematics worksheet for content or a rubric, it is not acceptable to just take a screen shot and then paste it into your Word document (or only include a link to the resource). You may use the content (with appropriate citations), but you need to recreate this and make it your own.**

Parameters:

* Must be formatted to the STEM Design Brief Template. \*see below
* Must include embedded artwork/graphics that directly ties the design challenge to the selected literature (cover of book, pictures of characters, etc.)
* Must utilize the engineering design process for problem solving and require students to design and construct/build a solution to a problem.
* Must be aligned directly to the Arkansas Science Standards (physical, life, Earth/space science), the Standards for Technological and Engineering Literacy, and the Arkansas Mathematics Standards.
* The completed assignment must be submitted electronically as one single document, both as a Word document and .pdf) before the due date.
* The following should all be included with your project:
  1. Curriculum guide written for the teacher
     + The teacher guide must include title, grade level, STEM standards, big ideas, essential question(s), scenario, challenge, tools, materials, and resources, STEM content information related to identified standards, results/deliverables, limitations, assessment/evaluation, and any directions to the teacher or additional worksheets/materials that are necessary.
  2. A simplified design activity guide written for the student (age appropriate wording) including an engineering design journal or design sheet that utilizes or scaffolds the design loop/process/method in some fashion.
     + The student guide must include title, big ideas, essential question(s), scenario, challenge, tools, materials, and resources, results/deliverables, limitations, assessment/evaluation, and any directions or additional worksheets/materials that are necessary for the student to complete the design challenge.
* Additionally, you will need to prepare a brief presentation to class over the selected literature, STEM content, and the design challenge.

**Format for the Project**

**Title:** Use a catchy title the will attract the attention of students and provide a hint at the task in front of the students.

**Grade Level:** Use standards and content knowledge to determine the appropriate grade level of the design brief.

**STEM Content Standards:** Identify content standards from each of the STEM fields, but don’t try to deliver everything known to humankind in one design brief. Be sure to include one standard from the Arkansas Science Standards (Life, Earth/Space, or Physical Science), one Standard for Technological and Engineering Literacy (include both standard and benchmark), and one Arkansas Mathematics Standards. You may also consider an ETS standard from science, ELA, social studies, or other standards.

**Big Ideas**: Identify the major concepts that will be delivered through the design brief. It should be central to the STEM disciplines, hold the potential to engage students, include commonly misunderstood materials, and be important enough for the students to remember when they are 30 years old. Look at the standards that you have identified for the project – what are those big ideas?

**Essential Question:** What question or questions will the student be able to answer after completing the design challenge? Remember to use **open-ended/open-response** types of questions.

\*If you are having trouble with big ideas and essential questions – refer to the reading on this subject.

**Scenario:** Write an engaging scenario that will capture the attention and possibly intrigue the students. Fictional scenarios are entirely appropriate. A good scenario will place the students into the story or challenge.

**Challenge:** In specific terms, identify exactly what the student teams are required to do to fully answer the challenge in the design brief (i.e., build a tower as tall as possible that will support the weight of a golf ball using only the materials available). Use a statement that says construct, build, make, etc.

**Tools, Materials, and Resources:** Identify all the tools, materials, and resources that will be available to the students as they attempt to solve the challenge. Try to keep the list small, students need to know that in the work world, unlimited supplies are rarely available and there are benefits to solving problems as efficiently as possible.

**Content information:** Provide any content information and/or research materials related to each of the identified STEM content standards that the students will need to adequately solve the design challenge.

**Results:** Identify what (exactly) the students need to deliver to the teacher upon completion of the design challenge (i.e., what product, notes, journal, etc.). Results are sometimes referred to as deliverables.

**Limitations:** Identify the boundaries for the students (maximum size, materials allowed, how fast/slow, etc.). Think about all of the ways that student creativity might take their solution beyond your boundaries. Limitations are sometimes referred to as parameters or constraints.

**Assessment/Evaluation:** List and describe, in specific terms, how the students will be evaluated. A rubric is a good choice. Identify how you will assess each of the standards that you have selected for the project. Also remember to evaluate the contributions of all team members so that one student isn’t left doing all the work.

**Literature-Based Curriculum Development Assignment Grading Rubric (150 pts)**

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| --- | --- | --- | --- | --- | --- |
| **Category** | **Exemplary (Full Points)** | **Proficient (Partial Points)** | **Developing (Minimal Points)** | **Not Present (0 Points)** | **Points Earned** |
| **Book Selection & Originality (15 pts)** | The book and design challenge are original, creative, and not commonly used in STEM activities. Clear evidence of a unique, thoughtful connection between the literature and the challenge. | The book and design challenge are mostly original but may have minor similarities to existing activities. Some creativity is evident. | The book or design challenge lacks originality or is a common STEM activity. Minimal connection between literature and challenge. | The book and/or challenge is unoriginal or missing. | /15 |
| **Alignment to STEM Standards**  **(20 pts)** | Clearly aligns with science (physical, Earth/Space, or life), STEL, and mathematics Standards. Selected standards are meaningful and well-integrated into the challenge. | Aligns with required standards, but some connections may be weak or unclear. | Attempts to align with standards, but alignment is superficial or incomplete. | No alignment to standards is present. | /20 |
| **Big Ideas & Essential Questions**  **(15 pts)** | Big ideas and essential questions are clearly defined, thought-provoking, and aligned with STEM concepts. They enhance student understanding. | Big ideas and essential questions are present but may lack depth or strong connection to STEM concepts. | Big ideas or essential questions are vague, simplistic, or disconnected from STEM concepts. | Missing big ideas and essential questions. | /15 |
| **Scenario & Challenge Design**  **(20 pts)** | Scenario is engaging, relevant, and effectively places students in the problem-solving context. Challenge is clear, well-defined, and requires application of the engineering design process. | Scenario and challenge are present and mostly clear but may lack full engagement or problem-solving depth. | Scenario is weak or unclear, and challenge lacks structure or problem-solving depth. | Scenario and challenge are missing. | /20 |
| **Tools, Materials, & Constraints (10 pts)** | A well-defined list of tools, materials, and constraints that effectively supports problem-solving while encouraging creativity and efficiency. | List is mostly complete but may include unnecessary or missing elements that impact effectiveness. | List is vague, missing key materials, or does not provide enough constraints for meaningful problem-solving. | No tools, materials, or constraints are listed. | /10 |
| **STEM Content Information**  **(15 pts)** | Clearly explains relevant Science, STEL, and Mathematics concepts with appropriate depth and accuracy. Includes supporting research or explanations for teacher and student understanding. | Provides STEM content information, but explanations may be incomplete or lack depth. | STEM content is minimally addressed, lacks clarity, or is not well-integrated into the challenge. | No STEM content information provided. | /15 |
| **Student Guide (20 pts)** | Clear, well-structured student guide with age-appropriate wording. Includes an engineering design journal or worksheet that effectively scaffolds the design process and STEM content integration. | Student guide is mostly complete but may have minor clarity or structural issues. Journal/worksheet is present but may be underdeveloped. | Student guide lacks clarity, is incomplete, or does not fully support student learning. | No student guide included. | /20 |
| **Teacher Guide (20 pts)** | Comprehensive, well-organized teacher guide including all required components (title, grade level, STEM standards, scenario, challenge, materials, content info, deliverables, assessment, etc.). | Teacher guide is mostly complete but may be missing minor elements or lack clarity in some sections. | Teacher guide is incomplete, missing major elements, or lacks clarity and organization. | No teacher guide included. | /20 |
| **Assessment & Evaluation**  **(15 pts)** | Clearly defined assessment methods, including a well-structured rubric or other evaluation tools that align with the standards and challenge outcomes. | Assessment methods are present but may lack depth, clarity, or strong alignment with challenge outcomes. | Assessment is weak, unclear, or does not effectively measure student learning. | No assessment/evaluation is provided. | /15 |

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| * + - * **LITERATURE-BASED CURRICULUM REVIEW CHECKLIST – WE WILL UTILIZE THIS FOR PEER REVIEW -** | | | | |
| **CONTENT REQUIREMENTS** | **YES** | **SOMEWHAT** | **NO** | **SUGGESTIONS FOR IMPROVEMENT** |
| Connected to an Appropriate Book or Text – overall, the design brief provides enough detail from the text to understand what is happening and why the students are designing a solution. |  |  |  |  |
| Aligned to STEM Standards   * Science (Life, Earth/Space, or Physical) * Standards for Technological and Engineering Literacy (standard and benchmark are included) * Mathematics |  |  |  |  |
| Integrated STEM Content is (OBVIOUS) for science, mathematics, and technology and engineering – multiple opportunity for students to engage in the content. |  |  |  |  |
| Performance Assessment Driven (Targeting STEM learning) |  |  |  |  |
| Requires Student Collaboration |  |  |  |  |
| Requires use of Design Process for students to construct a solution – and includes the design process that you developed earlier in the class – the design journal provides intentional practice of the target standards. |  |  |  |  |
| Ill-structured Problem (more than 1 potential solution) |  |  |  |  |
| Includes both a Teacher and Student Version |  |  |  |  |
| Includes OBVIOUS Big Ideas (that are drawn from standards) |  |  |  |  |
| Includes an engaging Scenario that extends the selected reading and get the students excited about the project. |  |  |  |  |
| Includes STEM Content Information (information that extends each of the identified standards for the project) |  |  |  |  |
| Includes Limitations (time, size, materials, etc.) |  |  |  |  |
| Includes Materials, Tools, and Resources (teacher and students will know what can be used) |  |  |  |  |
| Includes a clear challenge statement for students with appropriate directions and additional instructions for the teacher to conduct the design challenge. |  |  |  |  |
| Includes Specific Teacher Directions and Testing Information (Teacher will know how to test student solutions) |  |  |  |  |

**\*Provide detail comments on back**