**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.

**Literature-based Curriculum Design Project Rubric**

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| --- | --- | --- | --- | --- | --- |
| **Category** | Up to 10 pts. | Up to 25 pts. | Up to 45 pts. | Up to 60 pts. | **Score** |
| **Curriculum Content**  **(60 pts.)** | Curriculum developer does not present new information; does not follow recommended pattern; potential audience wouldn’t be able to grasp information/complete. | Curriculum developer was clearly uncomfortable with curriculum content and only included rudimentary information and/or partially met requirements. | Curriculum developer is at ease with content, but fails to fully address all requirements of the curriculum assignment. | Curriculum developer demonstrates full knowledge (more than required) and includes rich information that fully addresses the assigned task. Potential audience would learn. |  |
|  | Up to 10 pts. | Up to 20 pts. | Up to 30 pts. | Up to 40 pts. |  |
| **Curriculum Organization**  **(40 pts.)** | Potential curriculum audience would not understand because the product is not sequenced or organized adequately. | Potential curriculum audience would have difficulty following and completing the curriculum. | Curriculum is presented in logical sequence utilizing a recognized curriculum format. | Curriculum presents information in logical, interesting sequence using a recognized curriculum model which the potential audience can follow. The teacher’s guide is broken down so that the potential audience can understand the process for completing the activity with students. |  |
|  | Up to 10 pts. | Up to 20 pts. | Up to 30 pts. | Up to 40 pts. |  |
| **STEM Content and Alignment**  **(30 pts.)** | The curriculum does not thoroughly address standards or meet the intention of the standards. Minimal content information is provided. | The curriculum addresses standards but does not meet the intention of the standards. Some content information is provided. | Thoroughly addresses some of the standards and meets the intention of the standards. Some content information is provided. | Thoroughly covers standards and meets the intention of the standards. Thorough content information is provided. |  |
|  | 3 pts. | Up to 5 pts. | Up to 7 pts. | Up to 10 pts. |  |
| **Curriculum**  **Mechanics**  **(20 pts.)** | Curriculum has four or more spelling errors and/or grammatical errors. Organization was ill-conceived. | Curriculum had three misspellings and/or grammatical errors. Organization was an issue. | Curriculum has few misspellings and/or grammatical errors. Organization was adequate. | Curriculum has no misspellings or grammatical errors, was organized well, and was attractive. |  |
| **Comments: Total Points:** | | | | | |

**Format**

**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.

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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) |  |  |  |  |