An Open Educational Resource (OER) Learning Management System

for Sustainability and Environment Studies

Capstone Proposal

John Reilly

DGMD E-598

Digital Media Design Capstone Tutorial

Harvard Extension School

Instructor: Sylvain Jaume, PhD

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1. Project Scope

1.1 Project Title

An Open Educational Resource (OER) Learning Management System for

Sustainability and Environment Studies

1.2 Capstone Category & Related Courses

Web Development:

. CSCI S-3 - Introduction to Web Programming Using JavaScript

. CSCI E-12 - Fundamentals of Website Development

. CSCI E-31 - Web Application Development using Node.js

. DGMD E-20 - Modern and Mobile Front-End Web Design I

. DGMD E-25 - Creating Websites with Content Management Systems

. DGMD E-27 - Modern and Mobile Front-End Web Design II

. EDUC E-103 - Introduction to Instructional Design

. EDUC E-113 - Instructional Design Studio

1.3 Project Goal

The fundamental purpose of the Learning Management System is to bridge the gap between existing eLearning resources which are often too general and not focused on what environmental students need to learn in order to achieve the desired educational outcomes. Since students are more likely to use an e-Learning platform if it was initially assigned, instructors in Sustainability and Environmental Studies, then, are the primary target audience for the LMS who would wish to supplement their own teachings with the learning modules. The learning material is not supposed to be introductory or replace

textbooks or lectures, but rather to complement instructor teachings by delving deeper into Sustainability and Environmental Studies topics and issues. The LMS further differs from existing eLearning offerings by using an Understanding by Design approach advocated by Grant Wiggins and Jay McTighe. Key principles of this approach include using hooks, chunking, and repetition, having a big idea, addressing misunderstandings, and promoting enduring understandings (Wiggins and McTighe, 2005).

1.4 Learning Goals

. Create a Learning Management System in WordPress where instructors can not only easily revise existing content but also readily create their own learning materials.

. Develop my skills in curating instructional content.

. Learn to apply an Understanding by Design approach advocated by Grant Wiggins and Jay McTighe for the instructional content.

. Utilize my CSS programming skills in order to achieve the desired user experience for the LMS.

. Expand on my JavaScript programming skills which will be required to develop the more advanced features of the LMS such as a collapsible menu system and a responsive design.

. Build on my previous research and work from my ALM in Sustainability and Environmental Studies at the Harvard University Extension School.

1.5 Elevator Pitch

Although the project focus is to curate a Learning Management System to supplement programs in Sustainability and Environmental Studies, the System itself should not be limited to that particular field of study. Rather, the LMS should be developed so its capabilities are independent of the content. In this regard, the Capstone can be treated as a demonstration of the LMS for use in other educational and professional training applications.

1.6 Target Audience, Personas & Empathy Maps

In Instructional Design Studio (EDUC E-113) this past spring, I conducted student and instructor interviews in order to assess their Sustainability and Environmental Studies learning experiences. Three key educational outcomes were identified:

. Short, interactive lessons are more engaging than text.

. Blended learning allows students to proceed at their own pace.

. Offering multiple ways to teach the same skill is more engaging for students.

While eLearning can help achieve these outcomes, the availability of suitable Open Educational Resources in Sustainability and Environmental Studies is very limited. Furthermore, existing eLearning resources are often too general and do not hone in on what environmental students need to learn. This Capstone's Learning Management System, then, is specifically designed to bridge this gap.

While instructors in Sustainability and Environmental Studies are the primary target audience for the LMS, environmental students comprise a secondary target

audience. The three personas I included, then, were an instructor, an environmental

student, and a student new to Environmental Studies.

	Kathleen A newly married, 27 year old instructor. Has a Master's degree in Education, is very knowledgeable in Educational Technology, and advocates for Blending Learning and incorporating technology in her lessons.
Goals	Wants her students to learn and do well.
Frustrations	Unmotivated students and outdated learning approaches.
Tasks	Direct instruction, assigning work, supervision and assessment.
Quote	"Students don't hone in on what they need to learn."

SAYS	THINKS
Students need a purpose. Why am I reading this? Offering multiple ways to learn the same skill is more engaging.	Blended Instruction is more effective. Students need to be engaged to effectively learn.
DOES	**FEELS**
Assigns interactive work which is more engaging to students. Offers students multiple ways to learn.	Students not engaged when studying.

	Anna A single, 20 year old college junior. Is an Environmental Studies major, very focused and bright, and very comfortable with computer technology and usage.
Goals	Reinforce understandings in classroom and when studying.
Frustrations	Very busy so dislikes inefficient and ineffective work.
Tasks	Attends class and is active in Environmental groups and research.
Quote	"I would use eLearning resources if they were assigned."

SAYS	THINKS
eLearning often does not address what you need to learn.

Instructors assign a lot of unnecessary work. | eLearning is for high school or job training.

Prefers Interactive learning at her own pace. |
| **DOES** | **FEELS** |
| Reinforces understanding when studying.

Tries to maintain interest and focus when studying. | Desires more efficient and reliable access to environmental content for assignments.

Wants to do well. |

	Sean

A single, 18 year old college freshman.

Is a Business Management major, very bright and hard-working, expects to perform well in his classes, and new to Environmental Studies which fulfills a core requirement. |
Goals	Maintain interest and focus in the classroom and when studying.
Frustrations	Inefficient and unreliable Internet sources and too much reading.
Tasks	Attends class and mostly studies by reading textbooks and articles.
Quote	"The more I read, the less I am taking in."

SAYS	THINKS
Instructors assign an endless amount of reading.

eLearning is too general. | Many Internet sources are unreliable.

eLearning is too text based. |
| **DOES** | **FEELS** |
| Mostly studies by reading textbooks and articles.

Occasionally uses eLearning sites for finding resources. | Hard to maintain focus while reading.

Web searches are inefficient and very time consuming. |

1.7 Metrics, Rubric and User Survey

Assessment Rubric

Criteria/Metrics	Inadequate 1	Marginal 2	Fair 3	Good 4	Exceptional 5
Learning Design: Well-structured, interesting and engaging instructional content which supports enduring understandings.	Few conditions are met and enduring understandings are not supported.	Conditions are partially met and enduring understandings are partially supported.	Conditions are mostly met and enduring understandings are generally supported.	Conditions are met and enduring understandings are mostly supported.	Conditions are well met and enduring understandings are strongly supported.
User Engagement: Instructors will recognize that the LMS can be used to supplement their teachings.	Instructors find little value in assigning any of the lessons to their students.	Instructors find some value in assigning only a few lessons to their students.	Instructors find value in assigning some of the lessons to their students.	Instructors find strong value in assigning some of the lessons to their students.	Instructors find strong value in assigning many of the lessons to their students.
Application: Clearly demonstrates the capabilities of the Learning Management System.	Few of the capabilities of the learning experience are apparent.	Some of the capabilities of the learning experience are apparent.	Many of the capabilities of the learning experience are apparent.	Many of the capabilities of the learning experience are very apparent.	Most of the capabilities of the learning experience are very apparent.
Presentation: Clear and consistent professional-looking layout to garner interest in the Learning Management System.	Layout appears amateurish and garners little interest.	Layout appears somewhat professional and garners some interest.	Layout appears mostly professional and generally interesting.	Layout appears professional and appealing.	Layout appears very professional and very appealing.
Adaptability: Suitable for use in other educational and professional training applications.	Adaptability for other applications is not apparent.	Adaptability for other applications would require many changes.	Adaptability for other applications would require some changes.	Adaptability for other applications is apparent with few changes.	Adaptability for other applications is apparent with no changes.

User Survey

1. How interesting and engaging did you find the learning experience and why?

2. In what ways do you think the lessons could have lasting value for students?

3. Explain how well the lessons could be used to effectively supplement instructor teachings.

4. How valuable did you find the assessment quizzes and reflection questions in supporting the key learning objectives and why?

5. Explain how well the learning modules and resources demonstrate the capabilities of the Learning Management System.

6. How would you assess the value of the instructional activities for the overall learning experience?

7. How would you describe the user experience with the Learning Management System in terms of its, flow, continuity, clarity and ease of use?

8. How effective did you find the appearance and overall approach of the Learning Management System in capturing your attention and why?

9. How would you assess the role of instructor notes and reviews to tailor the learning experience for a specific instructor's use?

10. How would you rate the process of editing or adding content?

2. Competitor Review

1. The Khan Academy (https://www.khanacademy.org/science/biology/ecology)

    This eLearning platform offers detailed courses in Ecology which are primarily targeted to secondary education students. While the platform strongly supports interactive learning, the courses are introductory in nature and therefore would not complement instructor teachings. Furthermore, the courses focus on Ecology which is only a subset of the environmental field of study.

2. Tutorialspoint (https://www.tutorialspoint.com/environmental_studies/)

    This eLearning platform, unfortunately, is an excellent example of the inherent shortcomings of most existing eLearning resources in this space. While the platform does cover many Sustainability and Environmental Studies topics, the approach is to essentially provide a collection of text based instructional lessons, focusing on beginners and without any deep dives into the material. The coursework is very factual based rather than thought provoking and thus not very suitable for achieving enduring understandings by the students.

3. Humbolt State University (https://libguides.humboldt.edu/openedu/emp)

    This eLearning platform is essentially a repository for Open Educational Resources for Environmental Science and Management. The approach is not to present eLearning material but rather to assist students in finding available resources. Their selections, though, are mostly textbooks and courses which would present the same material typically covered by instructors rather than complement their teachings.

Features	Kahn Academy	Tutorialspoint	Humbolt State University	My Proposed LMS
Open Educational Resource	Yes	Yes	Yes	Yes
Environmental Content	No, Ecology primarily targeted to secondary education students.	Yes	Yes	Yes
Interesting and Engaging Content	Yes	No, essentially text based instruction.	No, designed as a repository.	Yes, by using Understanding By Design Principles.
Interactive Learning	Yes	No, essentially text based instruction.	No, hands off approach.	Yes
Complements Instructor Teachings	No, not by design.	No, not by design.	No, not by design.	Yes, instructional content designed specifically for this purpose.
Delve Deeper into Instructional Content	No, courses are introductory in nature.	No, focused on beginners.	No, presents the same material typically covered by instructors.	Yes, hones in on what students need to learn.
Allows Students to Work at Their Own Pace	Yes.	Yes.	Yes.	Yes.
Achieves Enduring Understandings	No, designed to thoroughly present instructional content.	No, factual based rather than thought provoking.	No, designed to provide access to instructional content.	Yes, by using Understanding By Design Principles.
Instructors Can Change Content	No	No	No	Yes, a design requirement.
Suitable for Use in Other Educational and Professional Training	Yes, Khan Academy offers many educational courses.	No, not by design.	Yes, but only as a repository.	Yes, a design requirement.

3. Technology Requirements / Resources / Materials

3.1 WordPress Content Management System

Description: A popular content management system which includes a database, a template system, and a plugin architecture.

Related Courses or Professional Experience:

. DGMD E-25 - Creating Websites with Content Management Systems
. EDUC E-113 - Instructional Design Studio

Alternative Technologies: Other popular content management systems including Joomla and Drupal.

Reason for Selecting This Technology vs. Its Alternatives: A key feature of the Learning Management System (LMS) is the ability of instructors to edit content with only basic knowledge of the content management system. I felt WordPress was the best choice due to its popularity and user-friendliness.

How It Will Be used in the Project: WordPress will provide many of the required features of the LMS as well as a built-in database to house the instructional content.

3.2. Custom CSS

Description: Additional CSS programming will be required to achieve the desired user experience for the LMS using the WordPress platform.

Related Courses or Professional Experience:

. CSCI E-12 - Fundamentals of Website Development
. DGMD E-20 - Modern and Mobile Front-End Web Design I
. DGMD E-25 - Creating Websites with Content Management Systems
. DGMD E-27 - Modern and Mobile Front-End Web Design II
. EDUC E-113 - Instructional Design Studio
. Web development experience at New Vision Systems, Inc.

Alternative Technologies: WordPress LMS plugins including LearnDash, Teachable, and LitterLMS.

Reason for Selecting This Technology vs. Its Alternatives: A LMS plugin would incur additional licensing fees and require instructors to know how to use it in order to edit content.

How It Will Be used in the Project: CSS programming along with JavaScript will be used to tailor the user experience of the WordPress platform into the custom LMS needed to meet the project requirements.

3.3. Custom JavaScript

Description: Additional JavaScript programming will be required to develop the more advanced features of the LMS using the WordPress platform.

Related Courses or Professional Experience:

- . CSCI S-3 - Introduction to Web Programming Using JavaScript
- . CSCI E-12 - Fundamentals of Website Development
- . CSCI E-31 - Web Application Development using Node.js
- . DGMD E-25 - Creating Websites with Content Management Systems
- . EDUC E-113 - Instructional Design Studio
- . Web development experience at New Vision Systems, Inc.

Alternative Technologies: The extensive library of WordPress plugins which offer a wide assortment of custom functions and features.

Reason for Selecting This Technology vs. Its Alternatives: Many of the better plugins would incur additional licensing fees while only partially meeting the project requirements. However, a free plugin which can adequately address a requirement will be used if it can save a significant amount of custom JavaScript programming.

How It Will Be used in the Project: JavaScript programming will be required to develop the more advanced features of the LMS such as a collapsible menu system and a responsive design which would be very difficult to achieve solely through the limited capabilities of the included features in WordPress.

4. Developer Manual / Design Workflows / Methods

The Learning Management System will be developed as an eLearning website using the WordPress content management system with HTML5 Blank as the active theme. This minimalistic theme will allow the user experience to be fully realized with custom CSS and JavaScript programming as well as the selection of a few key WordPress Plugins. Here is the proposed website map:
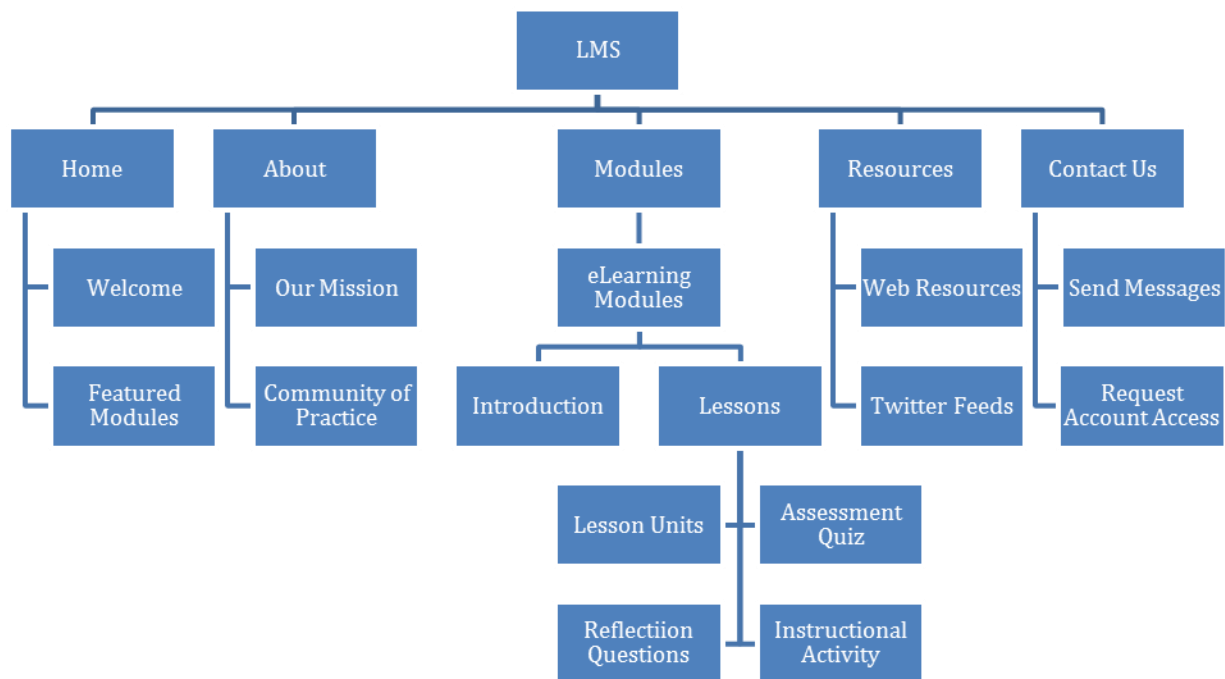
With the instructional content being maintained in a WordPress database, instructors will be able to easily create their own learning modules, lessons, or activities with only basic WordPress knowledge. The instructional design of the LMS will adhere to an Understanding by Design approach. The key Understanding by Design techniques deployed include using hooks, chunking, and repetition, having a big idea, addressing misunderstandings, and promoting enduring understandings (Wiggins and McTighe, 2005).

High-Level Overview. Briefly describe your learning experience, including the type of learning experience, intended audience, duration, etc. Use the Instructional Design Mad Lib to assist you.
The LMS will offer Sustainability and Environmental Studies eLearning modules to instructors who wish to supplement their own teachings. The instructional content will be curated using an Understanding By Design approach.

Content Topic: Identify the content topic that will be explored. Though broad, this is often where instructional designers begin.	Big Idea: Keep in mind the misunderstanding or gap, and identify the big idea, a ***concept*** about this topic that is worth knowing and can be applied to other content/contexts. It provides a unifying and thoughtful way to focus the design of the project. The big idea should be expressed in a few words.
Open Educational Resources for students in Sustainability and Environmental Studies	Align eLearning resources for students in Sustainability and Environmental Studies.

Misunderstanding or Gap: Think about the prior experiences, knowledge, and mindset of the learners. What might they misunderstand about this topic or what is a gap in their thinking/experience that prevents them from understanding this topic and/or big idea? This may be informed by any combination of research, observation, or interviewing.
Existing eLearning resources are too general and do not hone in on what students need to learn.

6 Facets of Understanding: The 6 facets are a tool to help unpack what deep learning looks like. Not all facets are applicable for all projects; however, consider each one. What could a possible desired understanding or learning outcome be through the lens of each of the six facets? Share your notes here.

Explanation: Really gets at explaining something in the learner's own words	Perspective: Gets at what it means to see the big picture or consider various points of view
Students will understand how short, interactive lessons can be more engaging than text based assignments.	Students will understand how interactive learning allows students to learn at their own pace.
Interpretation: How to make sense of something	Empathy: Asks the learner to "walk in another's shoes"
Students will understand that there are multiple ways to learn the same skill.	Students will understand that one way of learning may be more effective for some students than others.
Application: Matches knowledge to context	Self-Knowledge: Gets learners to think about their own thinking
Students will understand how eLearning resources can provide better access to suitable web resources.	Students will understand that they learn better when they are more focused and engaged.

Why/Enduring Understanding(s): Frame your big idea as 1–2 understanding statements. The understanding statement is expressed as a full-sentence statement and represents an insight, inference, or conclusion about the big idea that learners should gain. Rather than the facts you want them to learn, the understanding statement looks to the meaning of the facts.

Students will understand that Open Educational Resources can be aligned to match their needs in Sustainability and Environmental Studies.

Evidence of Understanding: How will you know that your learners have obtained the desired understanding? This is often thought of as assessment in formal learning environments. For self-paced and informal learning experiences, this may be more difficult to identify but try.

The LMS will provide assessment quizzes and reflection questions as well as instructional activities for collaborative problem solving.

Learning Flow: What is the general flow of the learning experience? You may provide a bulleted high-level list, create a Journey Map (a timeline that graphically maps the experience), or other graphic organizer.

The LMS will offer instructional learning modules to supplement instructor teachings. Each module will comprise of an introduction to capture the student's attention and several lessons reinforcing the big idea and helping to achieve enduring understandings. Each lesson with be comprised of lesson units, an assessment quiz, reflective questions, and an instructional activity.

Learning Theories: What learning theories—the way in which how people learn—will your learning experience draw upon? List them and make sure you research them further to see how they inform the approach you'll take.	**Pedagogies:** What pedagogies—methods of how people teach—will your learning experience draw upon? List them and share why.
. Backward Design Model– Following the Understanding by Design Approach, the instructional content will be designed to achieve specific learning goals. . Problem Based Learning – Instructional activities will be designed for student groups to solve a challenging problem.	. Blended Learning – The instructional content will supplement instructor teachings. . Active Learning – Students will be engaged in the learning process through reflective questions and instructional activities. . Collaborative Learning – Students will work collaboratively on instructional activities.

Inspiration: Identify at least three other learning experiences/products that inspire your project, e.g., workshop, training, e-learning course, game, curriculum, museum exhibit, YouTube channel, etc. Be specific.

. Crystal Bridges Museum of American Art online learning courses
. LinkedIn Learning
. Managing eLearning Projects from elearningindustry.com

5. User Manual / User Journey

Step 1: The student selects the Home page and clicks on the Featured Learning Module assigned by the instructor or navigates to the Modules page to choose this Module.
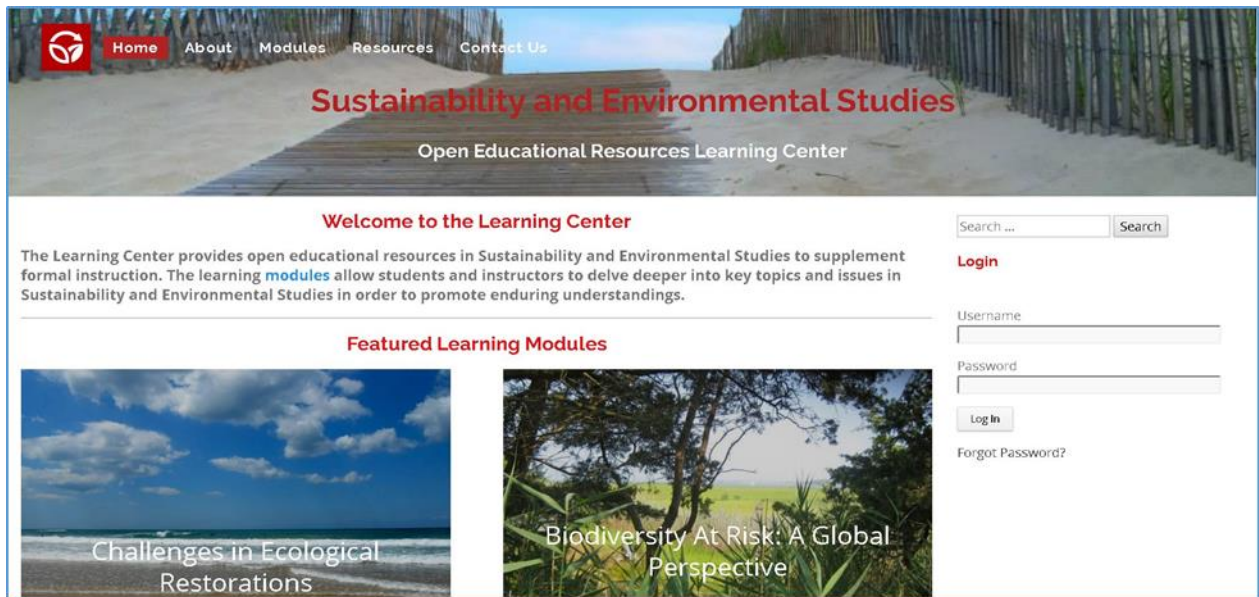

Step 2: Having launched the assigned Learning Module, the student reviews the Introduction which is intended to capture their attention and introduce the big idea. The Lessons within the Learning Module are shown in a collapsible menu.

Step 3: The user clicks on the Lesson assigned by the instructor and then proceeds through the interactive Lesson Units which can consist of videos, websites, articles, research papers, and opinion papers. These Units will utilize many of the Understanding by Design techniques including hooks, chunking, repetition, having a big idea, addressing misunderstandings, and promoting enduring understandings.
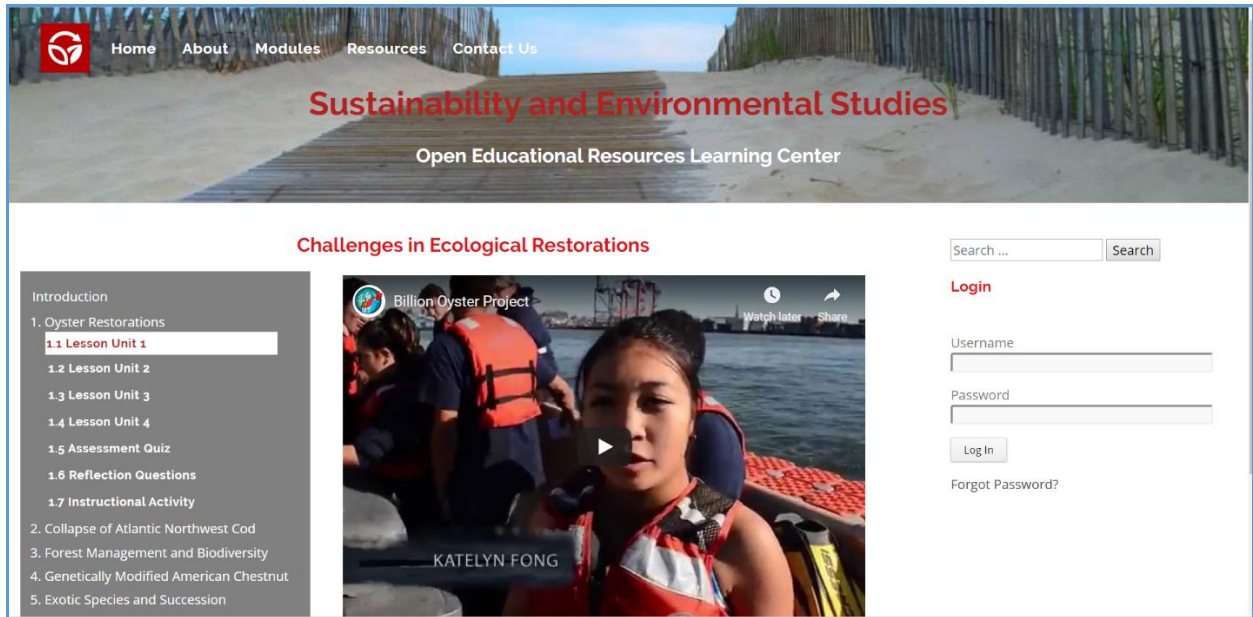
Step 4: After completing the Lesson Units, the student takes an Assessment Quiz to assess their understanding of the instructional content. Quiz questions will fall within one of the six facets of understanding of the Understanding by Design approach (Wiggins and McTighe, 2005).
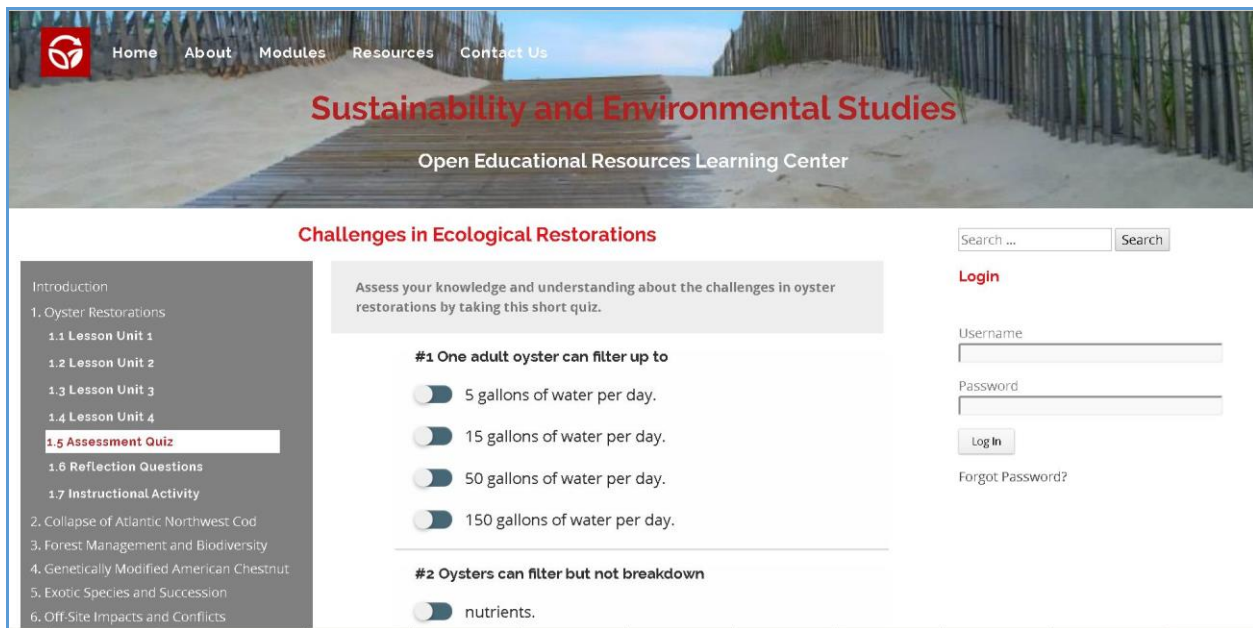
Step 5: Following the Understanding by Design approach, the student completes two reflective thinking questions on the instructional content. Reflection Questions and other questions throughout the Lessons are meant to be thought provoking to enhance understanding. They cannot be answered with a simple yes or no.

Step 6: Completing the assigned Lesson, the student works collaboratively in a group to solve a challenging problem. This Instructional Activity is intended to reinforce the enduring understandings of the instructional content.

6. Work Plan and Milestones
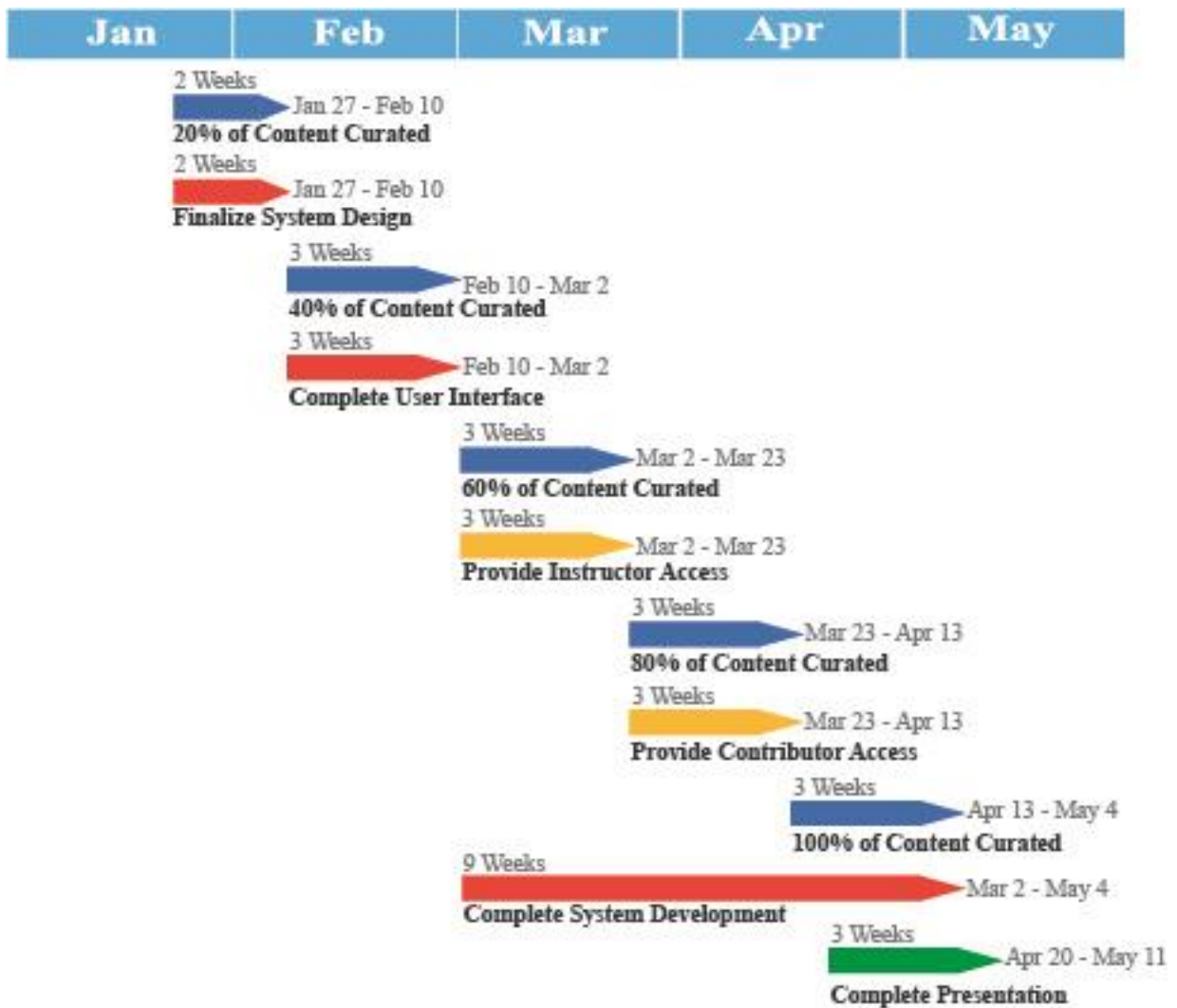
Milestone	Completion	Deliverable Description
Finalize the System Design	February 10	Finalize the design of the Learning Management System and curate the first 20% of the instructional content.
Complete the User Interface	March 2	Complete the user interface for the LMS and curate the next 20% of the instructional content.
Provide Community of Practice Access for Instructors	March 23	Provide instructors with secured access to post reviews on the learning modules, lessons, and activities and curate the next 20% of the instructional content.
Provide Community of Practice Access for Contributors	April 13	Provide contributors with secured access to update and create learning modules, lessons, and activities and curate the next 20% of the instructional content.
Complete the System	May 4	Complete the development of the LMS and curate the final 20% of the instructional content.

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