Wind Energy eLearning Module

Matt McGrievy, Stephanie Ruiz

College of Education, University of South Carolina

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Treatment Report

Explanation

Gagne's Nine Events of Instruction model will be used for this eLearning module. This model presents 9 events intended to activate executive processes that are required for learning to occur (Driscoll, 2005). Corresponding to the conditions of learning, these events are "based on a mental processing model of responses to stimuli that are designed to produce learning" (Jeffery & Ahmad, 2018, p.112). Each step is designed to target a cognitive process and ensure information is processed and retained (Driscoll, 2005). Gagne's theory includes five categories of learning outcomes: "verbal information, intellectual skills, cognitive strategies, attitudes, and motor skills" (Driscoll, 2005, p.356). In practice, these instructional events provide elements of a good instructional design and promote the transfer of knowledge in all learning categories. (Neo et al., 2011).

The nine events of instruction and their associated internal processes are:

1. Gaining attention (Reception)
2. Informing the learners of the objective (Expectancy)
3. Stimulating recall of prior learning (Retrieval to working memory)
4. Presenting the content (Selective perception)
5. Providing "learning guidance" (Semantic encoding)
6. Eliciting performance (Responding)
7. Providing feedback (Reinforcement)
8. Assessing performance (Retrieval and reinforcement)
9. Enhancing retention and transfer (Retrieval and generalization)

Gaining attention is intended to orient and engage the learner to the instruction (Driscoll, 2005). It is often achieved through a stimulus change, and may happen at various times throughout the lesson. Informing the learner of the objective is achieved by stating the instructional goals and informing the learner of what they will be able to demonstrate or do after receiving the instruction. This allows the learner to prepare for learning and identify information related to the goal.

Stimulating recall of prior learning encourages learners to remember and apply prior knowledge to new learning situations or tasks (Driscoll, 2005). While a simple reminder may suffice in stimulating recall, some cases require a more intensive review of the prior knowledge. Presenting the stimulus varies depending on the content to be learned. In all cases, it should emphasize the main elements of

the learning content to “facilitate the process of pattern recognition and selective perception” (Driscoll, 2005, p. 375).

While providing learning guidance varies depending on the learning goal, it should always facilitate the movement of information into long-term memory in a meaningful way (Driscoll, 2005). To ensure that learning has taken place, eliciting performance is used. This allows the learner to illustrate their learning to themselves and interested parties. Once the learning has been demonstrated, feedback should be provided on the performance. Providing feedback should be a specific process that assists the learner in correcting any errors made.

Assessing performance refers to a formal assessment of the new information gained by the learner (Driscoll, 2005). Feedback is also provided at this point in the instruction. While enhancing retention and transfer is the final event in the instruction, it often occurs throughout the instructional process. This event allows learners to appropriately transfer the skills learned.

Rationale

Gagne’s Nine Events of Instruction accounts for internal and external conditions affecting student learning (Neo et al., 2011). It provides a design that accounts for instructional conditions that facilitate the different types of learning that exists (Jeffery & Ahmad, 2018). This model is used to “influence, support and provide the necessary conditions for learning” (Neo et al., 2011, p 381). Because this model supports the processes that occur during learning throughout the instruction, it was chosen for this learning module (Driscoll, 2005) . Using these events will facilitate instruction that is engaging and meaningful (Jeffery & Ahmad, 2018).

In addition to supporting learning, Gagne’s Nine Events allows for flexibility within the lesson design (Driscoll, 2005). While the events are presented in order of one through nine, the order may vary with the instructional delivery system used. This allows for eliciting performance, providing feedback, and enhancing lesson transfer for each set of objectives within the model instead of simply at the end. This supports the learning throughout the entire module and corrects misconceptions and errors as they are encountered. Each section of the module includes steps two through nine, facilitating the transfer of knowledge throughout the course.

Lesson Structure

- **Gaining Attention**: How big is the blade of a wind turbine? Think of an estimate and click next to see!

- **Informing Learners of the objective**:
    - In this module you will learn about wind energy, how it is created and used, and its environmental impacts. You will complete three modules using readings, videos, and links to learn about the components of wind energy.
    - Upon completion of chapter 1, you will be able to define wind energy and differentiate the functions of components of a wind turbine.
    - After completing chapter 2, you will be able to describe the steps of energy creation and storage within a wind turbine and categorize types of wind energy projects.
    - Upon completion of module 3, you will be able to analyze environmental components that lead to the selection of a successful wind farm site, and evaluate the impact wind turbines have on environmental health.
- **Stimulating recall of prior learning:** Summary of basic facts on renewable energy. Brief recall of windmills for water.

- **Presenting the content:**
  [Providing Learning Guidance/Elicit Performance/Provide Feedback/Assessing Performance/Enhance Lesson Transfer - embedded within content section]
    - **Chapter 1:**
        - In chapter 1, you will learn about wind, wind energy, and the components of wind turbines. Chapter 1 Objectives: (**Objectives**)
            - After completing the module, the learner will be able to define wind energy with 100% accuracy.
            - After completing the module, the learner will differentiate the functions of components of a wind turbine with 90% accuracy
        - Present description and definition of wind and wind energy (**Content**)
        - Components of a wind turbine with definitions interactive slide show (**Content, Enhance lesson**)
        - EdPuzzle - what's inside a wind turbine? with embedded questions and feedback (**Elicit performance, Provide feedback, Enhance lesson**)
        - Review multiple choice questions (**Assessing performance)**
    - **Chapter 2:**
        - In chapter 2, you will learn how wind energy is created and used. Chapter 2 Objectives: (**Objectives**)

        - After completing the module, the learner will describe the steps of Wind energy creation and storage within a wind turbine with 90% accuracy
        - After completing the module, the learner will categorize types of wind energy projects with 90% accuracy
    - How do wind turbines work? Video (**Content**)
    - How do wind turbines generate electricity? - Video (**Content**)
    - Wind Energy Types: Small Wind, Utility-Scale, Offshore - reading **(Content, Learning guidance**)
    - Types of wind energy projects Quizlet (**Elicit performance, Learning guidance, Provide feedback, Enhance lesson**)
    - Review multiple choice questions (**Assessing performance**)

- **Chapter 3:**
    - In chapter 3, you will learn about both positive and negative impacts wind farms have on the environment. You will also compare wind energy to energy created by fossil fuels. Chapter 3 Objectives: (**Objectives**)
        - After completing the module, the learner will be able to analyze environmental components that lead to the selection of a successful wind farm site with 90% accuracy
        - After completing the module, the learner will evaluate the impact wind turbines have on environmental health with 90% accuracy

    - Where is wind energy harnessed? - reading. (**Content, Learning guidance)**
    - How to select a location for a wind farm - reading (**Content, Learning guidance)**
    - Ecological impacts of wind turbines - video (**Content, Learning guidance, Enhance lesson)**
    - Advantages and Challenges of Wind Energy - reading
    - Pros and Cons of Wind Energy Quizlet **(Elicit performance, Learning guidance, Provide feedback, Enhance lesson**)
    - Review multiple choice questions (**Assessing performance)**

Description of site

The content will be presented in three chapters preceded by an introduction. The introduction will include the “gaining attention”, “informing learners of the objective”, and “stimulating recall of prior learning” events of the learning model. The subsequent instruction will include events two through nine of the model. Chapter one will entail basics of wind energy and learning parts of wind turbines. Chapter

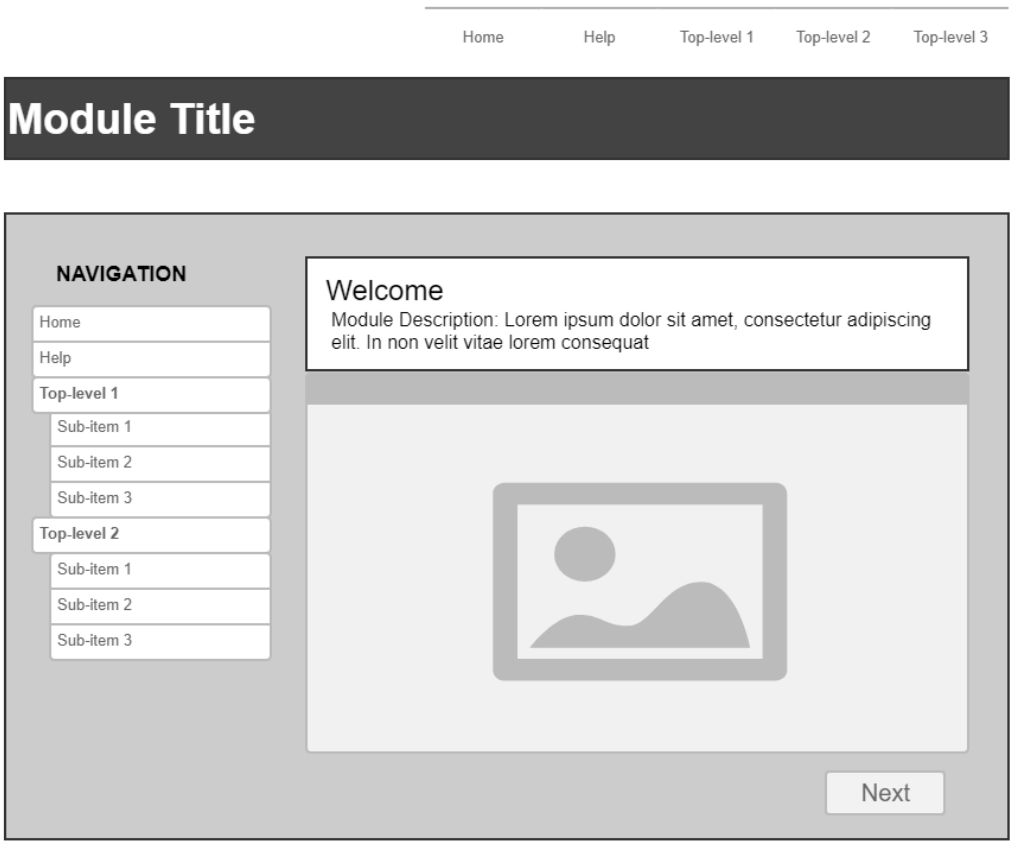
two will cover how electricity is generated in wind turbines. The module will conclude with chapter three, covering the environmental impacts of wind energy.

The interface for the web-based eLearning module will use two types of navigation: a primary, vertical hierarchical menu on the left-hand side and a secondary horizontal menu with vertical dropdown sub-menu items in the upper right. The menu content will be the same, so the learner can choose their preferred method for navigating the site. To reinforce the structure of the module, the three major topic items will use bold text in the primary menu, with sub-topics listed in regular text. “Previous” and “next” buttons in the lower right will be used to navigate between the module screens. A “home” link and a link that instructs learners how to navigate and use the module will be featured prominently in both menus.

The three types of pages in the module will be the home page, content pages, and assessment pages. The home page will contain a photo representing the learning content and a brief description of the module. Refer to Figure 1 for a wireframe of the homepage.

Figure 1

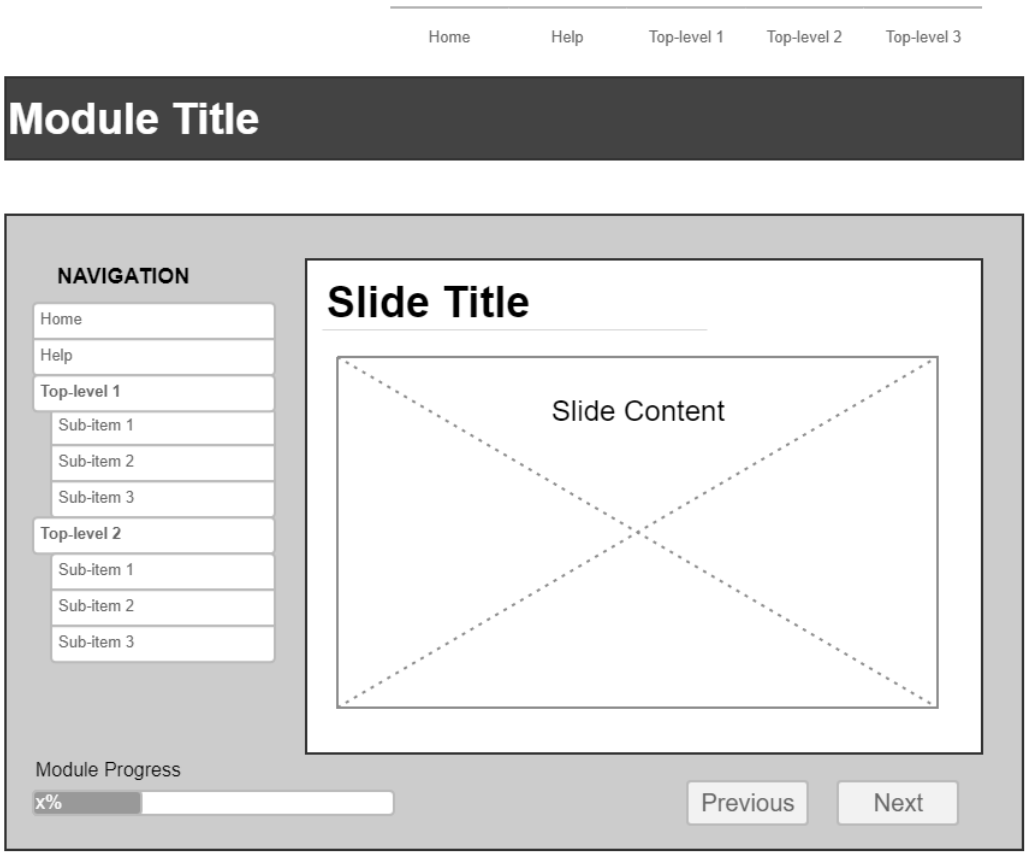
Wireframe of module homepage



Content pages will have a title and an area for learning materials below. Learning interactions will vary from screen to screen and will include text, embedded videos, and interactive graphics. See Figure 2 for a wireframe of the content pages.

Figure 2

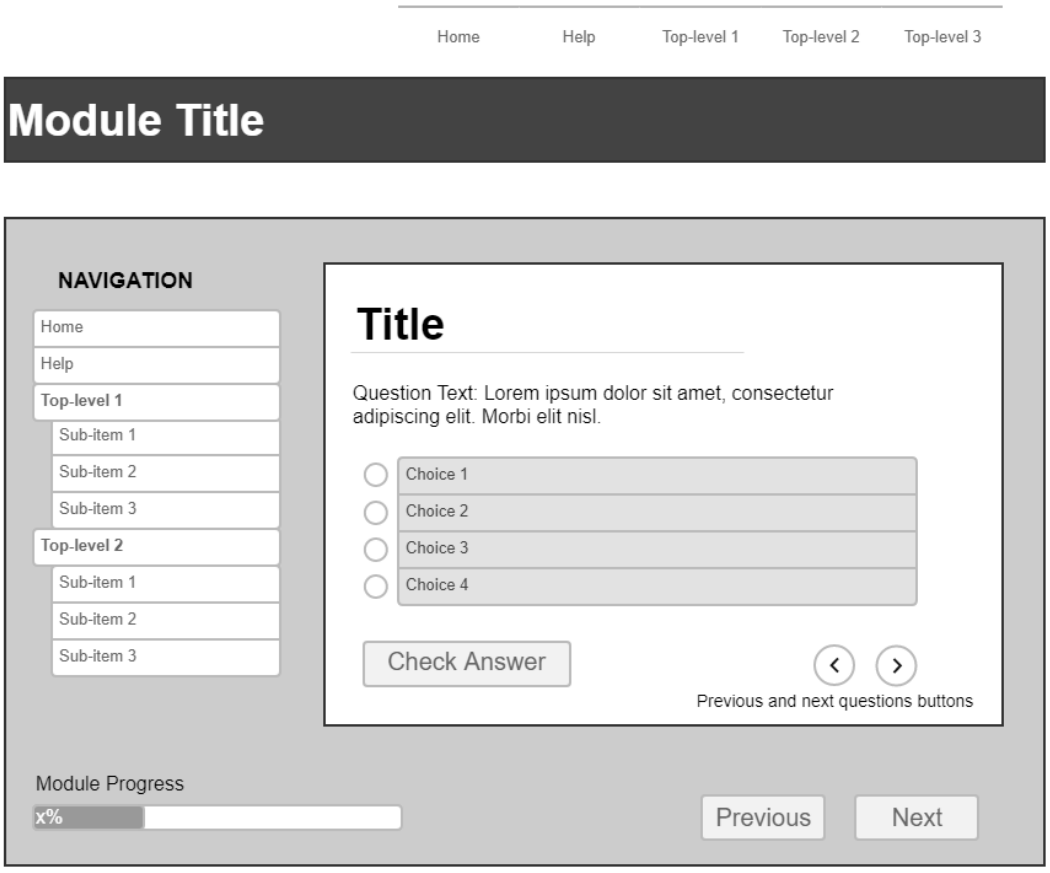
Wireframe of module content pages



Assessment pages will have a title, the question text, and a list of answer choices. In addition, when the learner responds, there will be a button to check their answer, which will provide feedback on whether the answer is correct or incorrect. Assessments will be embedded into a single screen, so there will also be backward and forward buttons to move through each of the questions. Refer to Figure 3 for a wireframe of the assessment pages.

Figure 3

Wireframe of module assessment pages

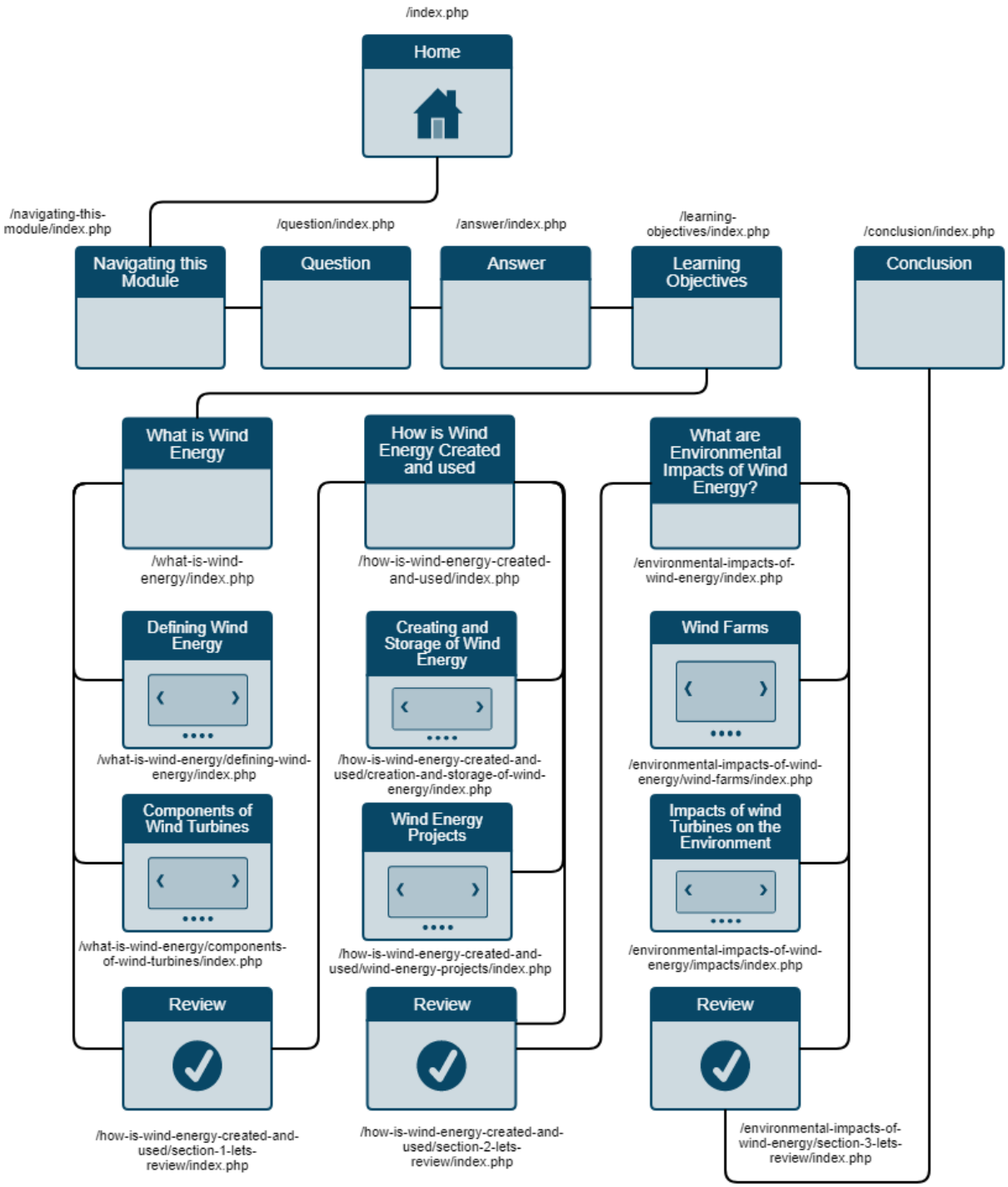


There will be a number of conventions to orient learners to the module and provide a predictable, user-friendly interface. A “how to navigate this module” slide will be used as the first slide to provide instructions and a summary of module features. Navigation buttons will have bold colors and hover effects to stand out from the content and draw attention. Within the navigation menu, the current page the learner is on will be underlined so they know where they are within the site. Learners will be guided on a linear path through the module, but the navigation will allow them to jump to other sections of the site if they prefer. All colors and typography will be consistent, and each screen will have the same layout. In addition, a progress bar will be used on all content and assessment pages to show the learner what percentage of the module they have completed.

Site Map

See site map below or at this link:

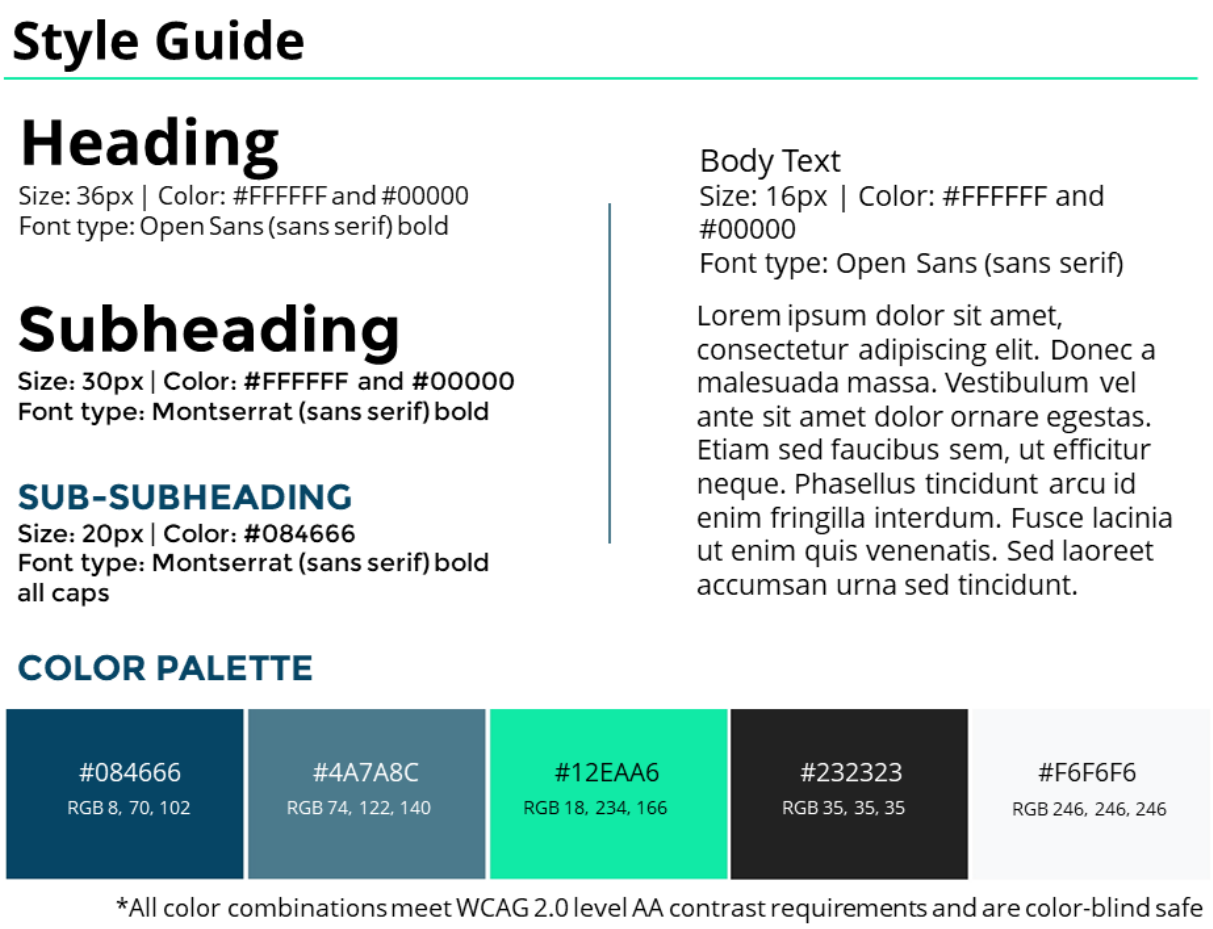
https://drive.google.com/file/d/1gm5sxVp_GgGSkx5xg0c_dPnPU1Lxgzv0/view



Style Guide

See style guide below or at this link:

https://docs.google.com/presentation/d/16Pmi_AiQSQ_9UA5zzyUTvHD4UIj34ibCtaa_GTVl_No/



https://drive.google.com/file/d/14c5mYpN_8facL-cCxg9hVMyLB2q3EQAK/view?usp=sharing

Storyboard

https://docs.google.com/presentation/d/1ableve43VDolIHAqs6RFMjOoA3x2eETa_r7A6TQKbQU/edit?usp=sharing

References

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Jeffery, M., & Ahmad, A. (2018). A conceptual framework for efficient design of an online operations management course. *Journal of Educators Online, 15*(3), 112-125.

Neo, M., Neo, T-K., Leow, F-T. (2011). Developing an interactive multimedia-mediated learning environment using Gagne's 9 events of instruction in a Malaysian classroom. *International Journal of Instructional Media, 28*(4), 379-389.