FUSE: Introduction to CSS

Project Description

FUSE is an e-learning course that has been created for interface designers and web developers to gain (or reinforce) knowledge of CSS fundamentals. To get the most value out of this course, students should have a conceptual understanding of the technology and structure of HTML. This course could ideally be taken concurrently with an HTML course. By having a working knowledge of CSS, designers and developers can make better informed decisions when creating user interfaces. Job candidates with a foundational knowledge of CSS also have access to a wider range of employment opportunities.

The content of the course came from a mixture of my own personal knowledge of CSS and W3Schools's CSS tutorial (https://www.w3schools.com/css/default.asp), which helped me structure the sequence and module content.

Learning Objectives

At the end of the course, students will be able to:
1. Represent **(2.1 Interpret)** HTML structure using CSS properties **(Cc. Knowledge of criteria for determining when to use appropriate procedures)**
2. Summarize **(2.4 Summarizing)** general CSS principles **(Bb. Knowledge of principles and generalizations)**
3. Recall **(1.2 Recalling)**, explain **(2.7 Explaining)**, and implement **(3.2 Implementing)** CSS properties in the correct syntax **(Ca. Knowledge of subject-specific skills and algorithms)**
4. Structure **(4.2 Organizing)** applicable CSS properties together appropriately **(Bc. Knowledge of theories, models, and structures)**
5. Plan **(6.2 Planning)** and construct **(6.3 Producing)** common website elements using CSS **(Cb. Knowledge of subject-specific techniques and methods)**

Knowledge Dimension	Categories					
	1 Remember	2 Understand	3 Apply	4 Analyze	5 Evaluate	6 Create
A Factual						
B Conceptual		2		4		
C Procedural	3	1, 3	3			5
D Metacognition						

Implementation

Implementation of the course was created using HTML and CSS that I custom-made for the project. When searching for e-learning systems, I was unable to find one that would allow me to embed custom elements and do some of the things I wanted to make the course effective. After the course, I plan on releasing my framework publically on GitHub. The site is also responsive, so it is easily viewable on a mobile device.

http://css.straton.design

F U S E
Introduction to CSS

Welcome!

What do you already know?

Introduction

Adding CSS to HTML

Syntax

Selectors

Commonly Used Properties

Text
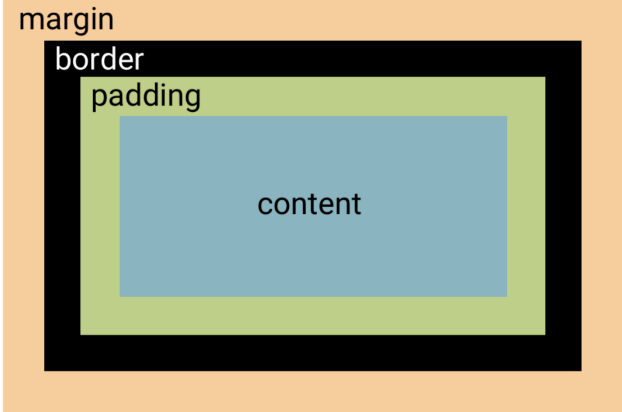
Background

Border

Others

The Box Model

Layout

Quiz

Finish

The Box Model 📦

In HTML, think about elements as if they were boxes. All element are "wrapped" in a box, which consists of the content, padding, a border, and margin.

- Content - This is the contents of the box (element)
- Padding - The space around the content between the border
- Border - This is the border around the content and padding
- Margin - The space around the border that separates the element from other elements

```
.myBox {
  background: yellow;
  width: 100px;
  height: 100px;
  padding: 20px;
  border: 4px solid black;
```

Back   Next

Application of Principles

Principle	Application
Multimedia	For the different topics discussed in the course, I included graphics to help supplement and support the text of the lesson.
Contiguity	When graphics are used, I placed them immediately following the text description. It is important to first understand what the CSS code is to properly link it to a visual aspect.
Redundancy	For this project, I did not use audio narration for the lesson. Due to the nature of CSS, it would be difficult to explain everything over voice without also having a reference to code syntax. In the future, however, I think it would be beneficial to narrate some portions of the lesson to better explain complex topics to the student
Coherence	Rather than including everything there is about CSS, I chose to focus on the fundamentals. In order to meet the learning objectives, I included the most commonly used CSS properties, which would lay the foundation for learning additional CSS properties.
Personalization	When writing the course, I tried to use a friendly, non-mechanical voice to explain the concepts. I also used emojis to break up the text-heavy pages with a little bit of friendly emotion. I did not, however, include a virtual coach with my implementation.
Segmenting and Pre-training	I made sure that the lesson was broken into small modules that could be easily understood or referenced later. These segments are visually displayed in the sidebar navigation of the course.
Worked Examples	In each section, I included examples of the code and how it would be used in a certain scenario. However, these are not "worked" examples. I planned on creating a final module where the students could watch a recording of me coding an example website. Due to time constraints, I did not include this. Worked examples would be a valuable addition to the course in the future.

Practice	Like worked examples, I included a partial opportunity for practice. I used quizzes in each section to let the student answer questions about what they had just learned. While these act as guided practice, they should not be considered replacement of full-features practice opportunities. Due to technical and time constraints, I was unable to implement my original plan of interactive coding practice.
Collaborative	N/A
Learner Control	Learner control is achieved by allowing the student to progress at their own speed using the "Back" and "Next" buttons. They also have the ability to jump to different sections in the course using the sidebar navigation. Since CSS is a highly syntactical skill, it should be easy to jump back for future reference.
Thinking Skills	Practice problems and examples give the students an opportunity to think about what they have learned. Thinking skills could also be improved by, in the future, including interactive coding exercises.
Feedback	For each practice quiz, as well as the post-test, I provide feedback on the correct answer. I includes a little more context to why the answer is what it is. Due to the limitations of the third-party services I used, I was unable to customize feedback between correct and incorrect answers. In the future, I believe it would be beneficial to differentiate the feedback types in order to provide more contextual and helpful feedback.

Evaluation

Participants/Method

To evaluate the effectiveness of my e-learning course, I recruited participants from the DePaul Participant Pool, as well as co-workers. My co-workers are web developers, however I only asked the ones who don't use CSS in their job responsibilities. Participants were asked to visit the course site, take the pre-test, go through the lesson modules, and then take the post-test. Both tests had the same 10 questions (see appendix). There were 16 participants who signed up, but only 12 completed the course and took both tests – some participants from the DePaul Participant Pool registered, but never completed the study. After participants completed the study, the pre-test and post-test scores were evaluated for statistical significance.

Results

Participant	Pre-Test	Post-Test
P1	8	10
P2	9	9
P3	9	10
P4	3	9
P5	3	8
P6	7	10
P7	9	9
P8	9	9
P9	8	9
P10	5	9
P11	5	8
P12	8	10

Data Analysis

The pre-test had a mean score of 6.92 with a standard deviation of 2.31. The post-test had a mean score of 9.17 with a standard deviation of 0.72. The statistical significance between the two groups is $p = 0.003$. Based on $p < .05$, this means that the increase in scores after taking the e-learning course is statistically significant. The effect size is 1.32, which means that the results also have strong practical significance as well.

Future Research/Development

During this project, I spent a lot of time developing the framework/structure for the course. Due to time constraints, I was unable to implement some interactive coding exercises that I desired to add. These exercises would better help achieve Learning Objective #5. Embedding coding tools would be an effective way to help the student practice in context to what they are learning. This could be accomplished by custom-making an interactive tool or finding a third-party service. In the future, I would also add additional practice questions with more visuals. Mentally linking code to a visible element is invaluable in fully understanding CSS.

Appendix

Pre/Post-test Questions

(LO 2)
What does the acronym of CSS stand for?
- >>> Cascading Style Sheets
- Calibrated Style System
- Cascading Style System
- Coordinated System Styles

(LO 2,4)
What statement most accurately describes the behavior of CSS?
- >>> The browser interprets CSS rules in the order they are written.
- The browser interprets CSS rules alphabetically.
- The browser skips CSS rules that have already been defined.
- Duplicate CSS rules cause the page to break.

(LO 2)
"A CSS rule can contain multiple properties"
- >>> True
- False

(LO 3,4)
What additional properties can be used with the "position: fixed" property? (Select all that apply)
- >>> top
- >>> bottom
- >>> left
- >>> right
- center
- middle

(LO 1,2)
Which of the following statements about the box model are true? (Select all that apply)
- >>> Block elements take up the full width of their container.
- >>> Inline elements resize to fit their content.
- >>> Padding is the space between the content and the border.
- It's not possible to change the thickness of a border.

(LO 3)
What property is used to change text color?
- >>> color
- text-color
- font-color
- word-color

(LO 1,2,3)
Which of the following options are valid selectors? (Select all that apply)
- .button
- #footer
- h1
- (img)

(LO 1,2)
Which of the following options is the recommended method for adding styling to an HTML page? (Choose one)
- >>> External style sheet
- Internal style sheet
- Inline styles

(LO 1,3,5)
What is the correct CSS property to create rounded corners on an element?
- >>> border-radius
- corner-style
- border-style
- corner-size

(LO 1,3,5)
What is the correct CSS property to create a drop shadow on an element?
- >>> box-shadow
- drop-shadow
- background-shadow
- shadow