

Team Zurg Design Project

Team Members:

**Brock Matzenbacher, Joshua Haupt,
and Mitchel Zurliene**



Overview

- ▶ Client: College Board
- ▶ Computer Science AP course - web application
 - ▶ Thinking Practices
 - ▶ Big Ideas
 - ▶ Interactive

Contextual Inquiry

User Preferences

- Quiz
 - Multiple choice questions
 - “Instantaneous” feedback
- Navigation
 - Data preservation
 - Breadcrumbs
- Interaction
 - Examples

Content

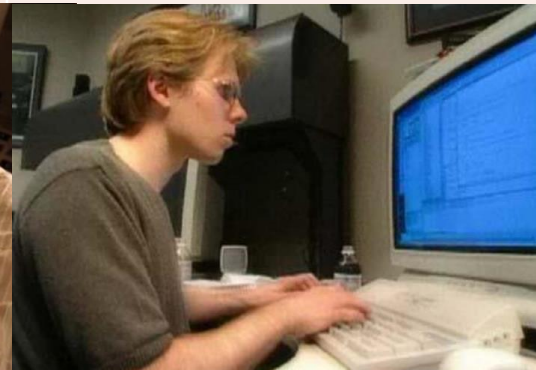
- Test
 - Realistic questions
- Examples
- Interaction

Event	Note	Marker	Type	Score	Task	Time	Observer
Task Started					Introduction	0:00:05	Matzenbacher, Brock
Task Stopped					Introduction	0:00:16	Matzenbacher, Brock
Task Started					Technical Ability	0:00:17	Matzenbacher, Brock
Marker	Laptop and cellphone	Q-Quote/comment	Technical Ability	0:00:40	Matzenbacher, Brock		
Marker	User seemed confused about question	(undefined)	Technical Ability				
Marker	User utilized algorithmic approach	Q-Quote/comment	Technical Ability				
Marker	User needed some probing to get more information	(undefined)	Technic				
Task Stopped			Technical Ability	0:02:49	Matzenbacher, Brock		
Task Started			Useability	0:02:53	Matzenbacher, Brock		
Marker	User seems well versed in web browsing, majority from laptop	Q-Quote/comment	Useability	0:05:14	Matzenbacher, Brock		
Marker	Bookmarks, multiple tabs	Q-Quote/comment	Useability	0:05:33	Matzenbacher, Brock		
Task Stopped			Useability	0:05:34	Matzenbacher, Brock		
Task Started			Preferences	0:06:14	Matzenbacher, Brock		
Task Stopped			Preferences	0:06:15	Matzenbacher, Brock		
Task Started			Student standpoint	0:06:15	Matzenbacher, Brock		
Marker	User assumes that students are thinking ahead	(undefined)	Student standpo				
Marker	computer science is a broad topic, consider probing deeper	Q-Quote/comment	Student standpo				
Marker	User likes the amount of design that went into the websites.	O-Observation	Student standpo				
Marker	User prompted to clarify the response	P-Participant prompted	Student standpo				
Marker	thinking ahead, persona: tidy, detail oriented	Q-Quote/comment	Student standpo				
Marker	Multiple choice questions are preferred	Q-Quote/comment	Student standpo				
Marker	Reason for choice seems related to a remembering tactic.	O-Observation	Student standpo				
Marker	Believe the user is hinting at a metaphor	O-Observation	Student standpo				
Marker	Consider reference links to applied knowledge that must be comfortable with	Q-Quote	Student standpo				
Task Stopped			Student standpoint	0:15:34	Matzenbacher, Brock		
Task Started			Teacher standpoint	0:15:36	Matzenbacher, Brock		
Marker	Relate to the usefulness of reality.	O-Observation	Teacher standpoint				
Marker	This seems like a useful resource for interview subjects as well, looking for a job in	O-Observation	Teacher standpoint	0:19:39			
Marker	Request for question variety	O-Observation	Teacher standpoint	0:21:30			
Marker	Ask about a portal service	Q-Quote/comment	Teacher standpoint	0:21:30			
Marker	User monitoring, Question randomization.	O-Observation	Teacher standpo				
Marker	Users abstraction, you dont have to how it can kill you for it to kill you.	O-obs	Teacher standpo				
Task Stopped			Teacher standpoint	0:25:36	Matzenbacher, Brock		
Task Started			conclusion	0:25:38	Matzenbacher, Brock		
Task Stopped			conclusion	0:25:48	Matzenbacher, Brock		

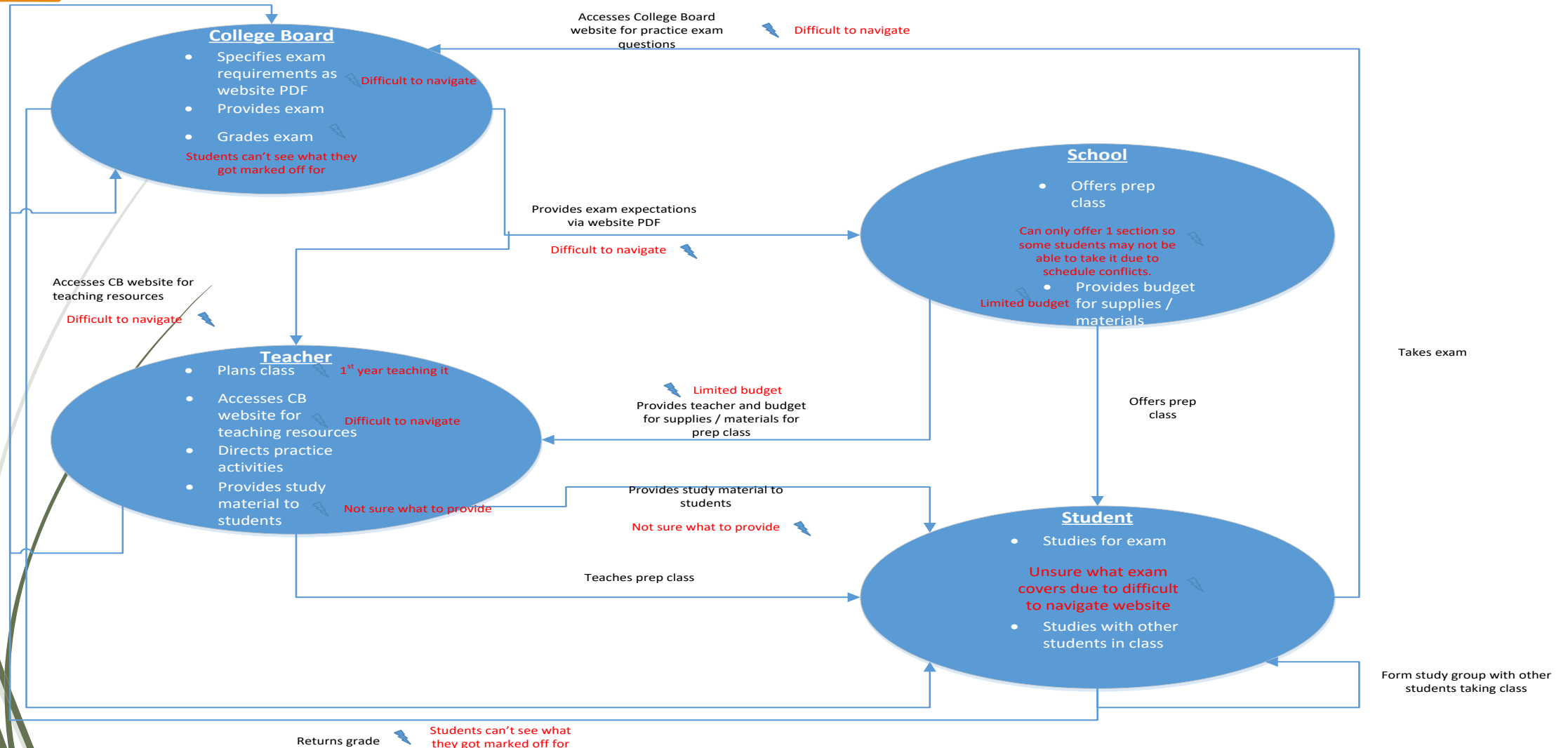
Contextual Inquiry

Personas

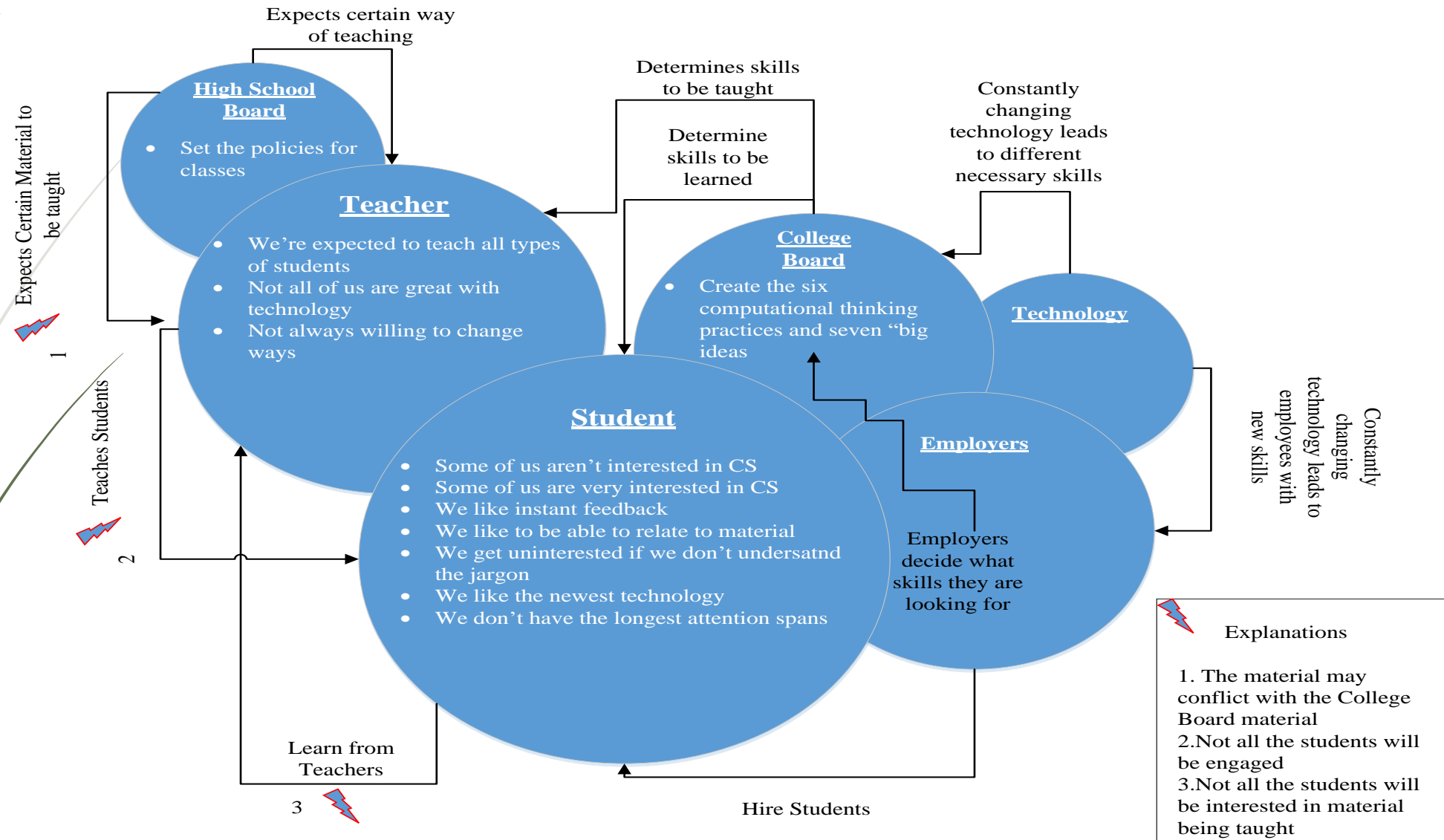
Who	Danny Banks	Bill Stanzas	Barry Whayer
What	Ex militant	C.S. Enthusiast	Teacher
Why	Daughter is interested, Parents are usually the ones who search.	Student that knows the jargon. Students Use the application	Teachers use the application



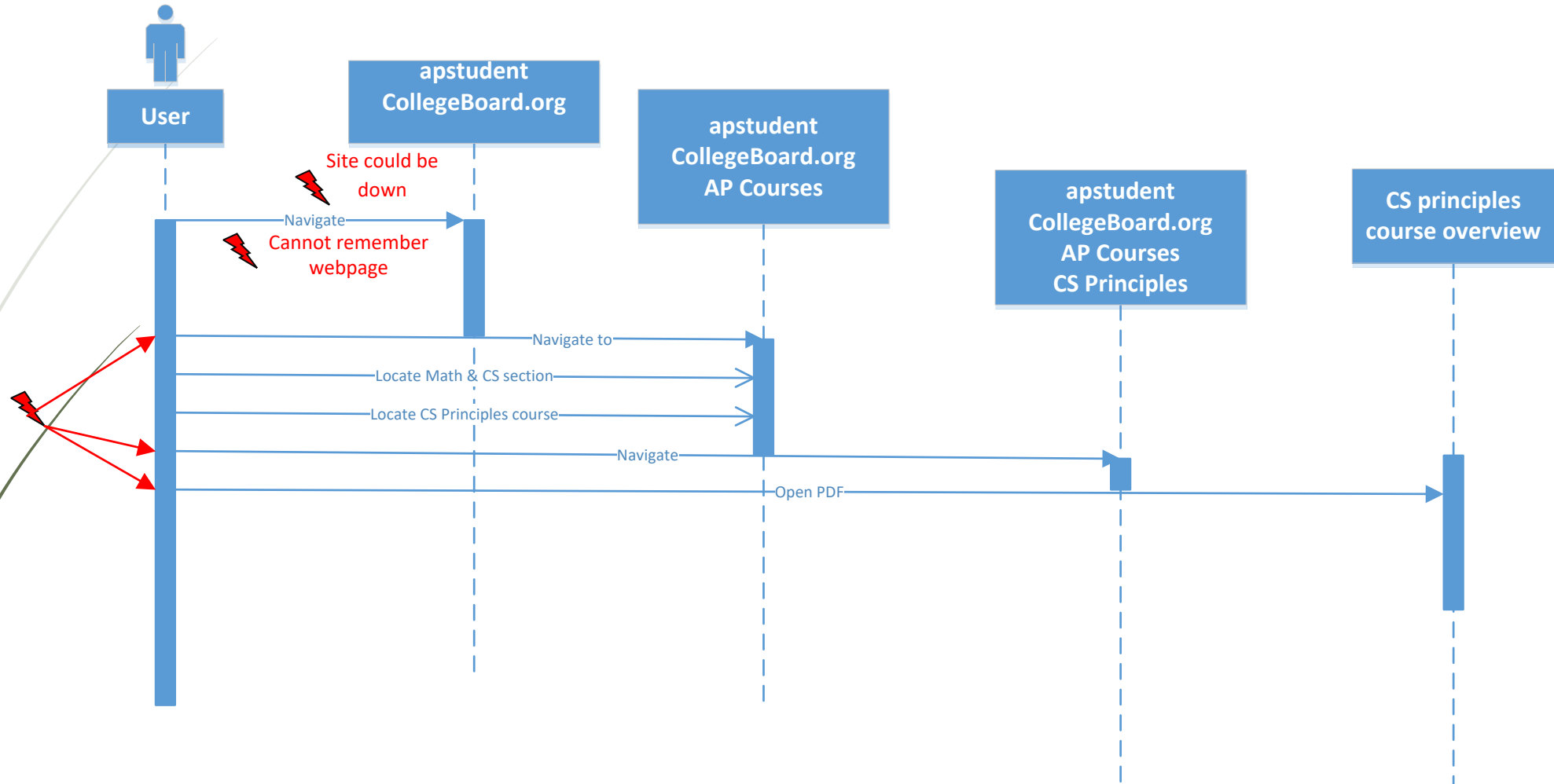
Work Model: Flow Model



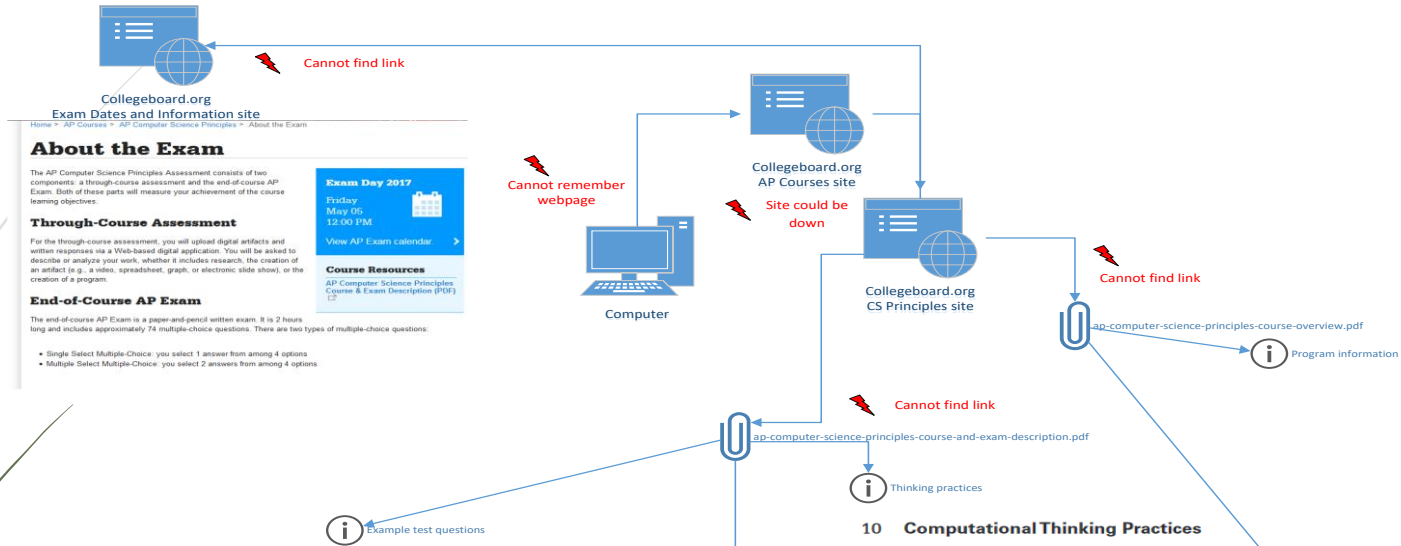
Work Model: Cultural Model



Work Model: Sequence Model



Work Model: Artifact Model



AP Computer Science Program

There are two computer science offerings, and students can take either course in any order. The AP Computer Science A course and exam continues to focus on computing skills related to programming in Java. The new AP Computer Science Principles course will complement AP Computer Science A as it aims to broaden participation in the study of computer science. The courses underscore the importance of communicating solutions appropriately and in ways that are relevant to current societal needs. AP Computer Science courses can help address traditional issues of equity, access, and broadening participation in computing while providing a strong and engaging introduction to fundamental areas of the discipline.

AP Computer Science Principles Course Overview

The AP Computer Science Principles course is designed to be equivalent to a first-semester introductory college computing course. In this course, students will develop computational thinking vital for success across all disciplines, such as using computational tools to analyze and study data and working with large data sets to analyze, visualize, and draw conclusions from trends. The course is unique in its focus on fostering student creativity. Students are encouraged to apply creative processes when developing computational artifacts and to think creatively while using computer software and other technology to explore questions that interest them. They will also develop effective communication and collaboration skills, working individually and collaboratively to solve problems, and discussing and writing about the importance of these problems and the impacts to their community, society, and the world.

1. A video-streaming Web site uses 32-bit integers to count the number of times each video has been played. In anticipation of some videos being played more times than can be represented with 32 bits, the Web site is planning to change to 64-bit integers for the counter. Which of the following best describes the result of using 64-bit integers instead of 32-bit integers?

- (A) 2 times as many values can be represented.
- (B) 32 times as many values can be represented.
- (C) 2^{32} times as many values can be represented.
- (D) 32^2 times as many values can be represented.

Enduring Understandings	Learning Objectives	Computational Thinking Practices	Essential Knowledge
2.1 A variety of abstractions built upon binary sequences can be used to represent all digital data.	2.1.1 Describe the variety of abstractions used to represent data. [P3]	P3 Abstracting	2.1.1A 2.1.1B 2.1.1E

2. A programmer completes the user manual for a video game she has developed and realizes she has reversed the roles of goats and sheep throughout the text. Consider the programmer's goal of changing all occurrences of "goats" to "sheep" and all occurrences of "sheep" to "goats." The programmer will use the fact that the word "foxes" does not appear anywhere in the original text.

- 10 Computational Thinking Practices
- 10 P1: Connecting Computing
- 10 P2: Creating Computational Artifacts
- 10 P3: Abstracting
- 10 P4: Analyzing Problems and Artifacts
- 11 P5: Communicating
- 11 P6: Collaborating

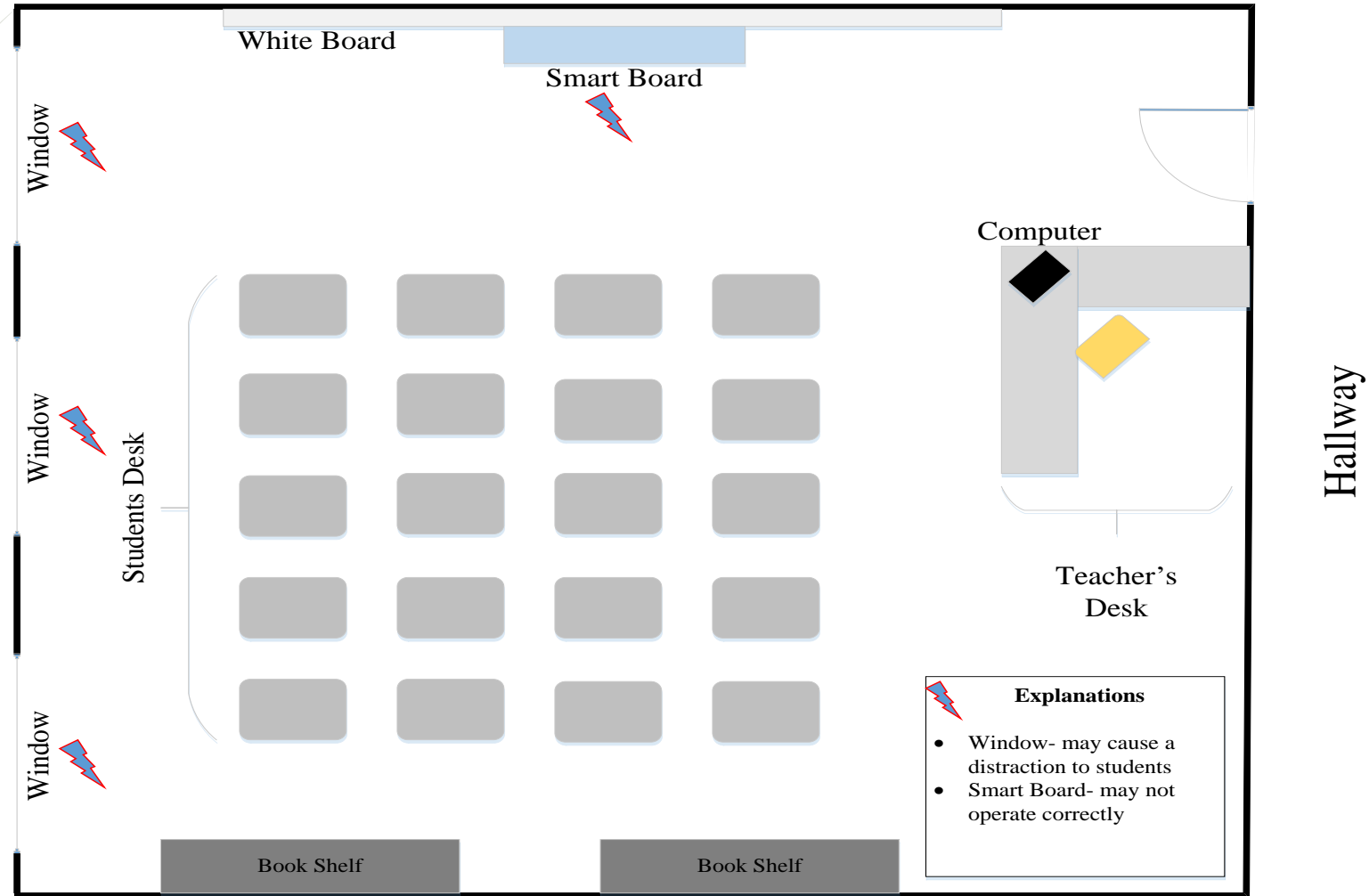
- 12 The Concept Outline
- 12 Big Idea 1: Creativity
- 15 Big Idea 2: Abstraction
- 19 Big Idea 3: Data and Information
- 23 Big Idea 4: Algorithms
- 27 Big Idea 5: Programming
- 32 Big Idea 6: The Internet
- 35 Big Idea 7: Global Impact

Team Zurg

Team Member: Mitchel Zurliene

Work Model: Artifact Model

Work Model: Physical Model



Work Models: Affinity Diagram

Organization / Navigation	Teacher	Student
Easy to navigate	Teachers view student progress	Tips for students
All info in one place	Class activity ideas for teachers	Students prefer "hands on" learning
User friendly UI	Teaching examples that can be built off of	Students prefer MC questions
Real world examples	Should clarify goals	Instant feedback
Easy Navigation	Wants question randomization	Instant feedback to questions
Easy to understand organization	Wants question variety	Address all students
Simple Nav bar		"Down to Earth" examples
Mobile and Desktop		Address all types of students
Appealing layout, (colors, buttons, etc)		Prefer multiple choice questions
Use Laptop and Cellphone		Algorithmic approach to problem solving
Bookmarks and multiple tabs		Prefers laptop
Looking for well designed website		Likes MC because of a remembering tactic
Portal service for all user types		Needs connections to reality
Brock	Mitch	Josh

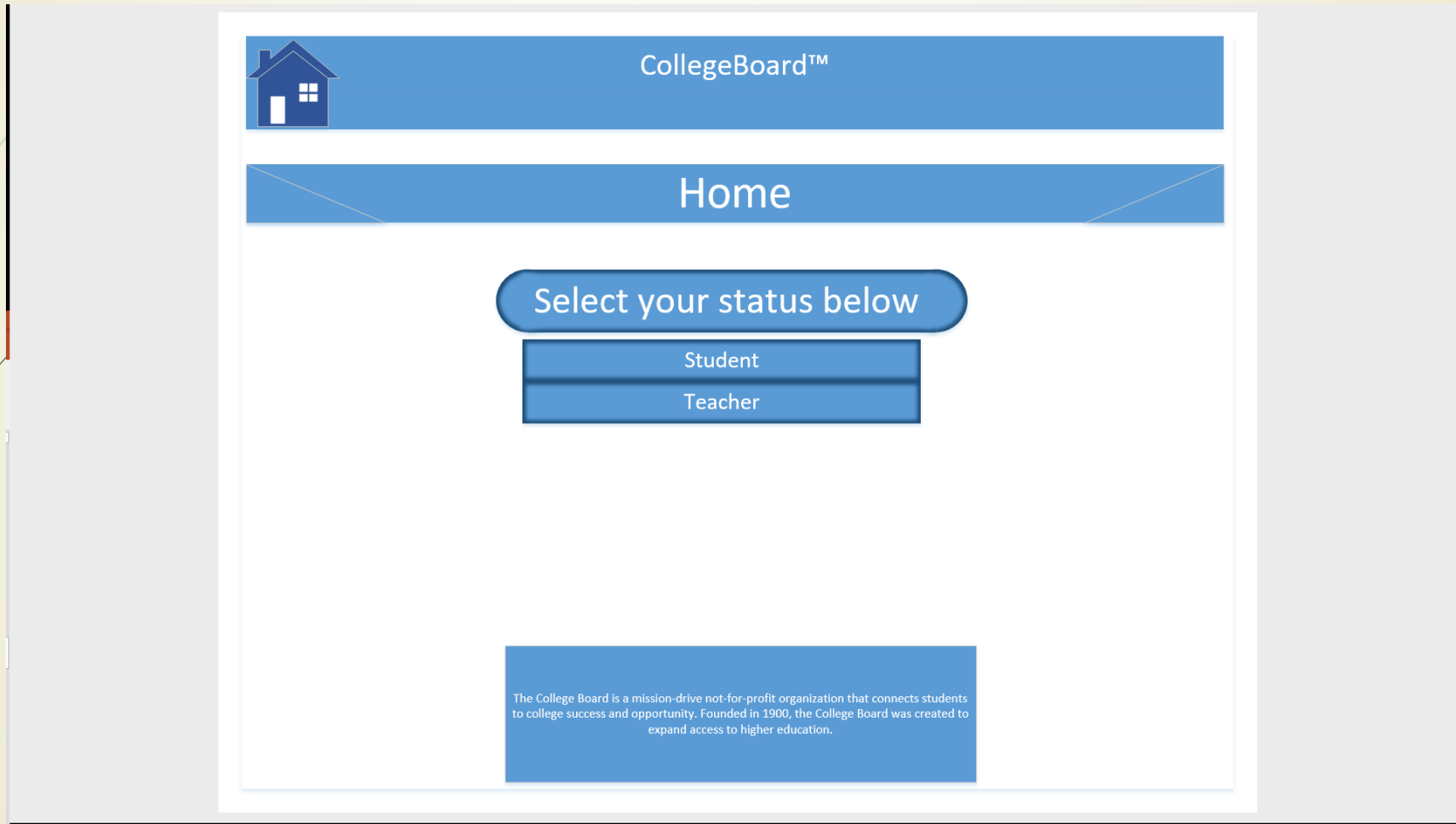
Impactful Issues

- Easy to navigate
- Class activities
- Instant feedback to questions
- "Down to Earth" examples

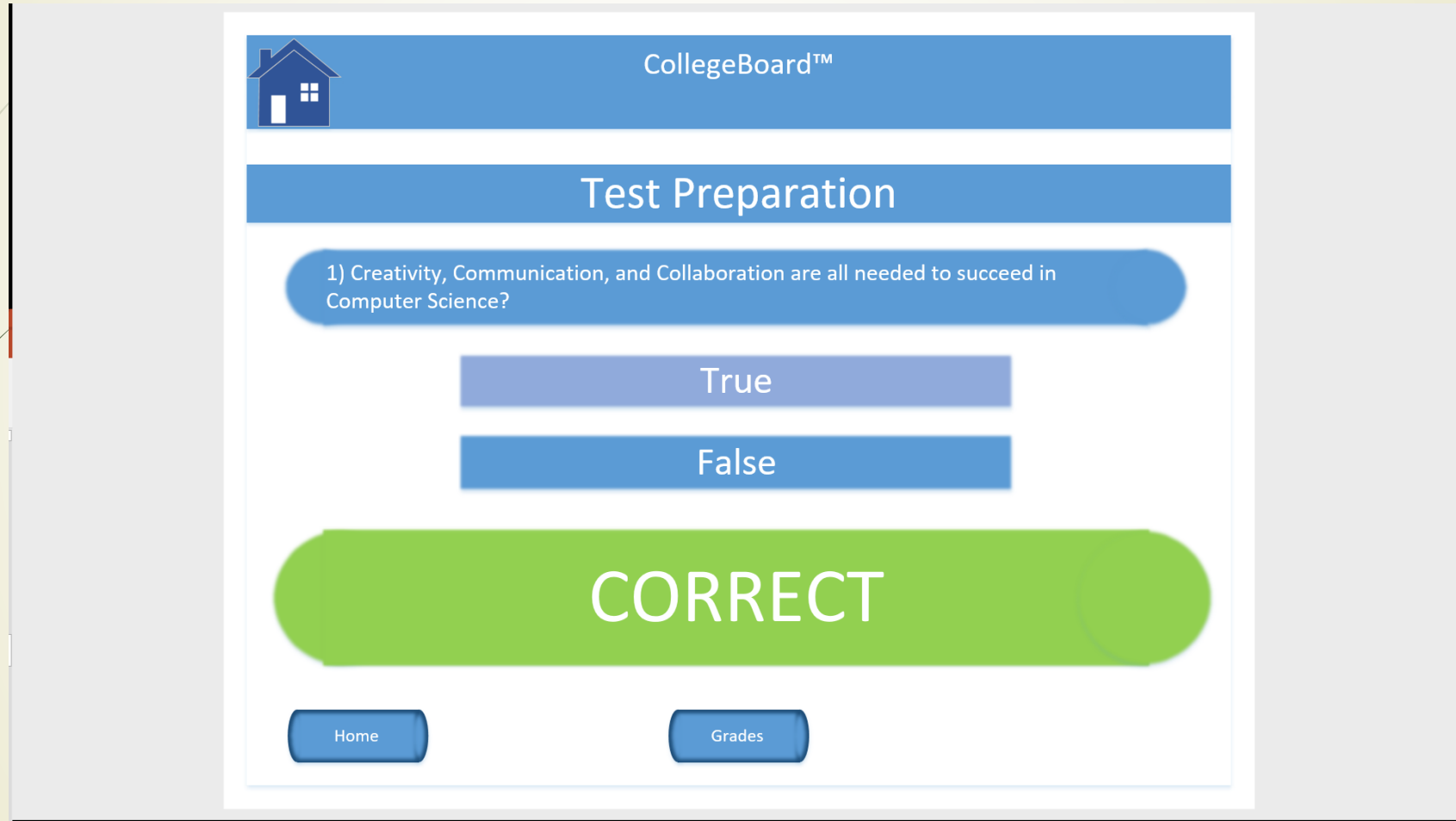


Low Fidelity Prototype

Main Menu

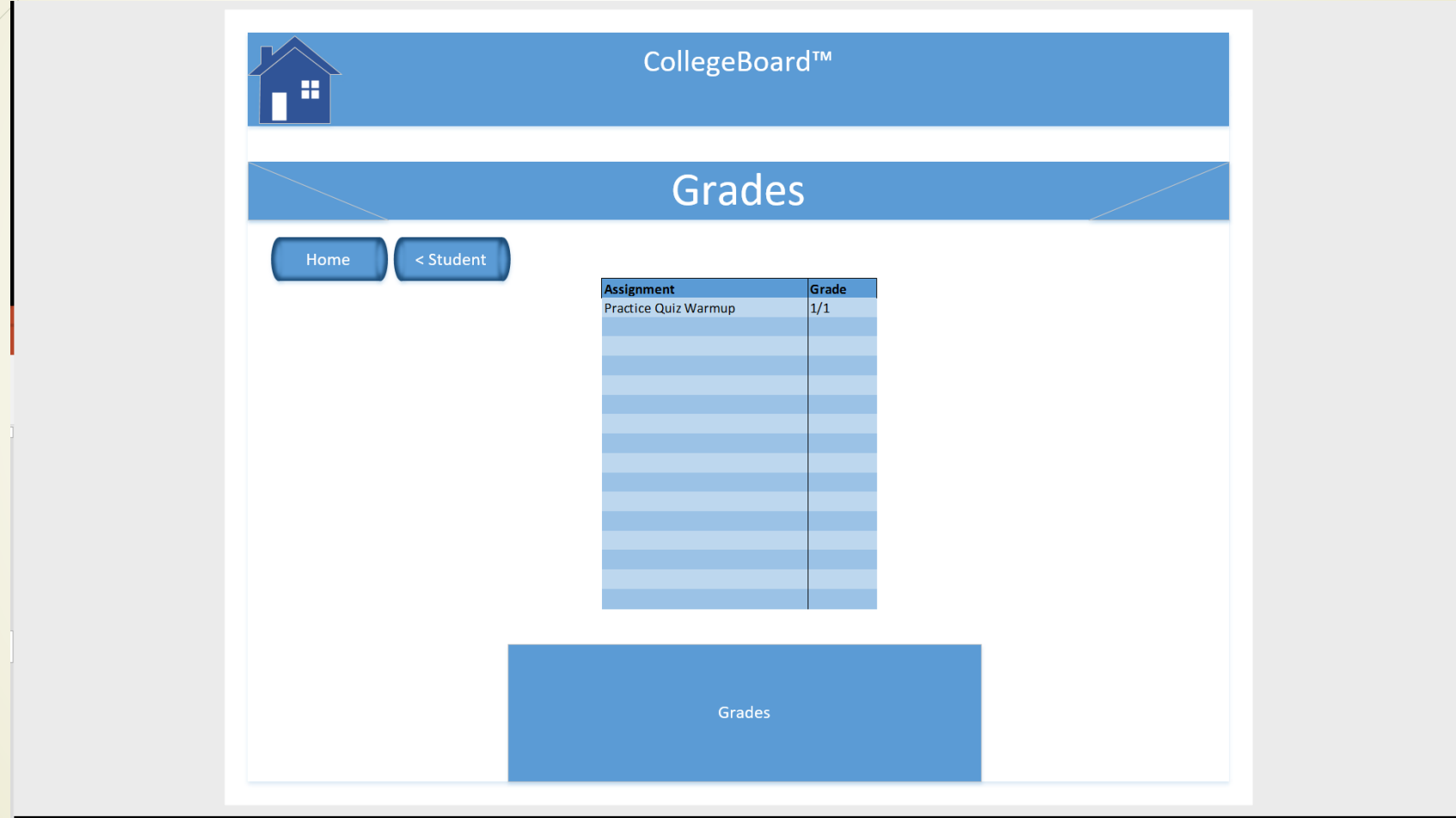


Practice Quiz



Quiz Grades

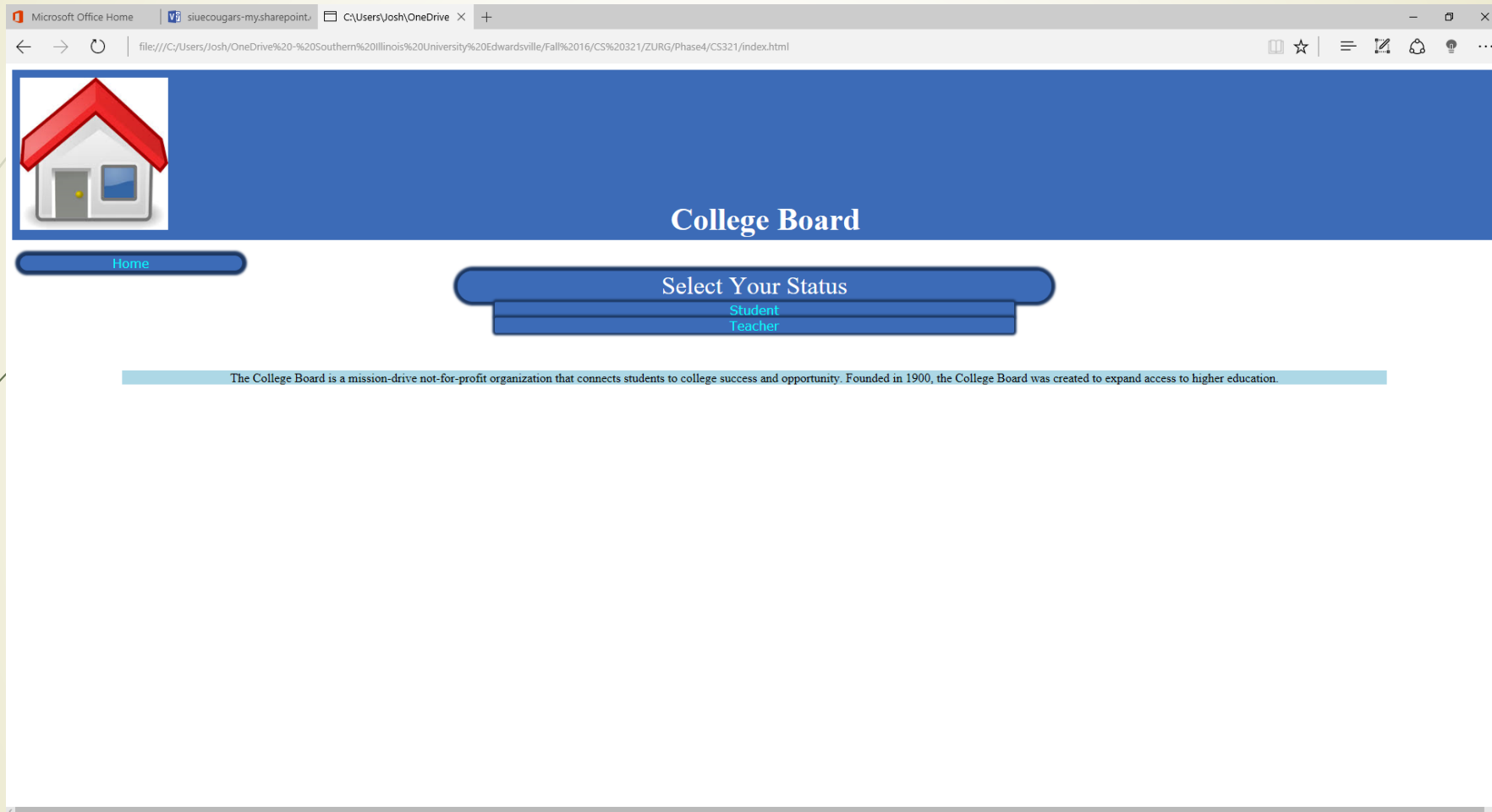
NOTICE: Our low fidelity prototype showed more design effort than our final Implementation.





High Fidelity Prototype

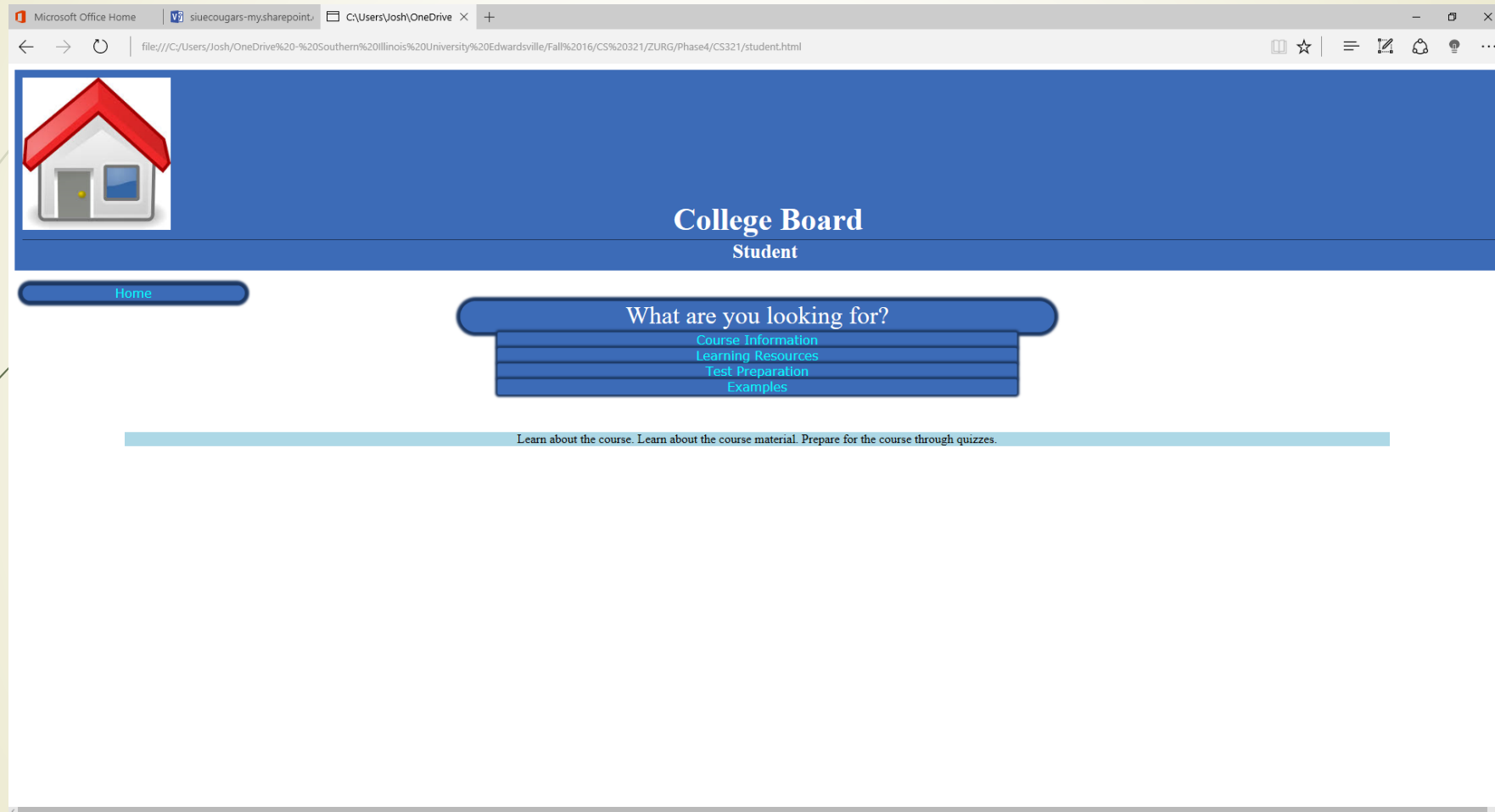
Main Menu



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High Fidelity: Main Menu

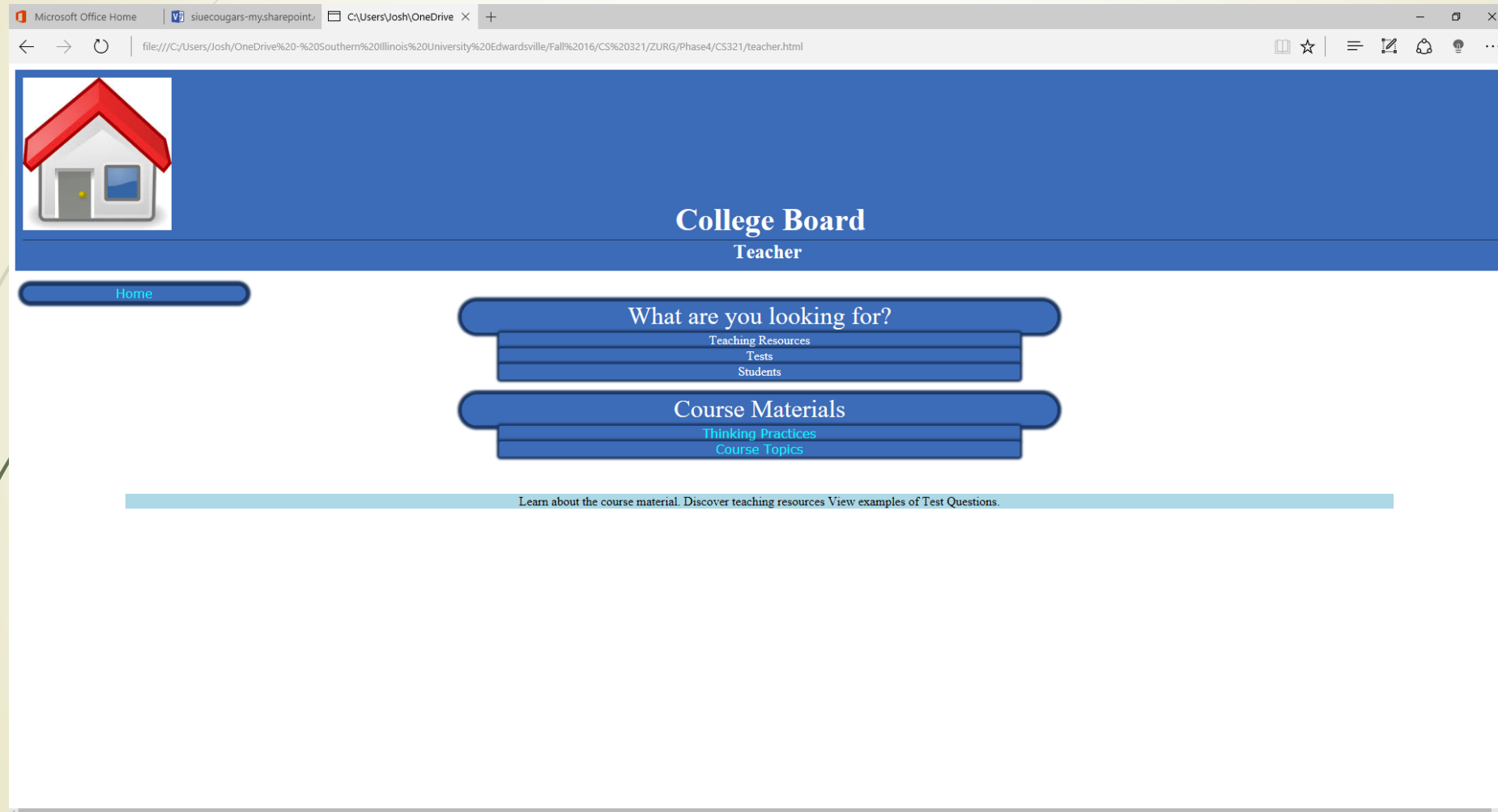
Student



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High Fidelity: Student

Teacher



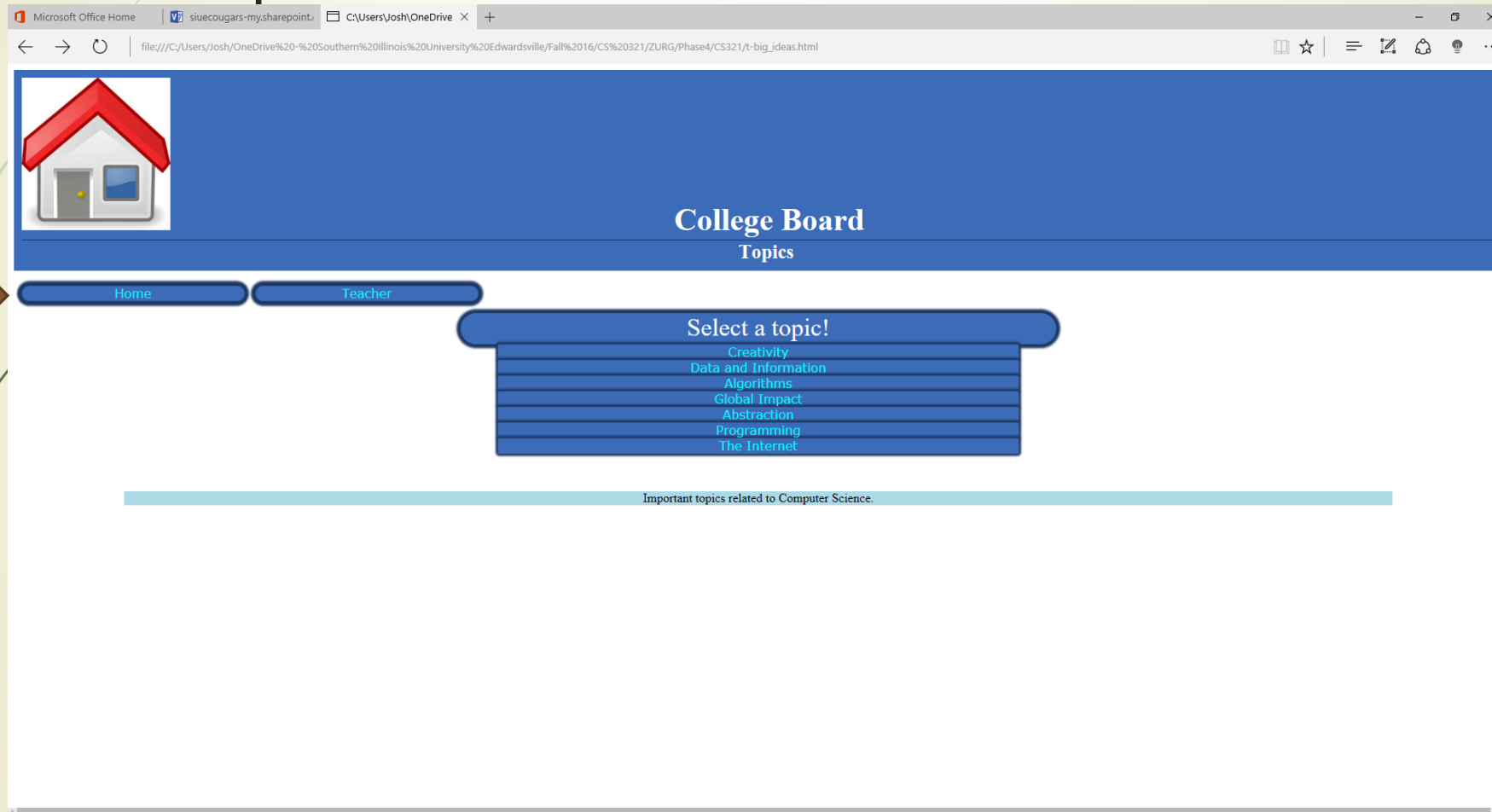
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High Fidelity: Teacher

What Subjects Liked and Disliked

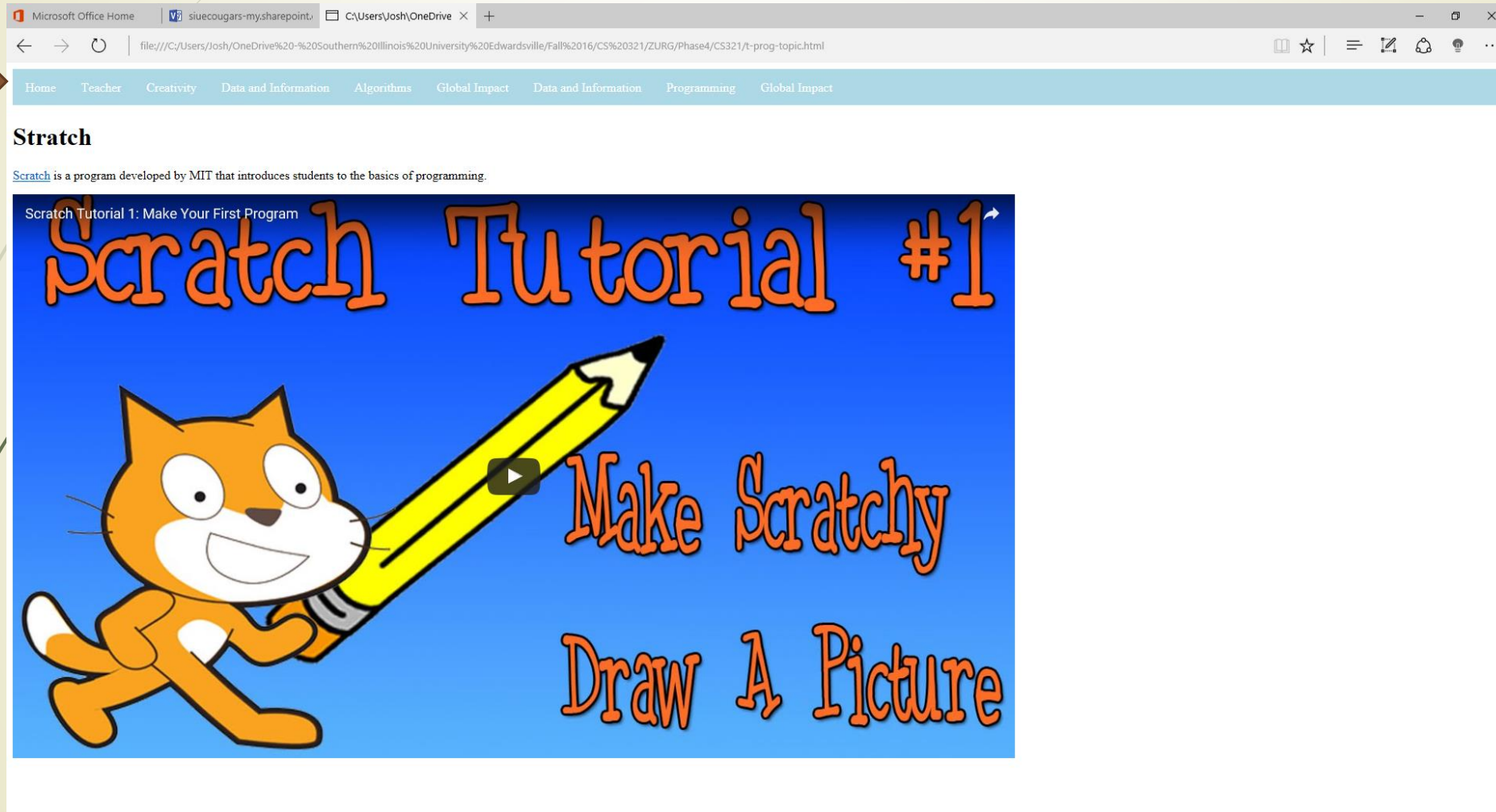
- ▶ Liked:
 - ▶ color scheme
 - ▶ Navigation
 - ▶ Easy to keep track of your current position and navigate back if desired.
- ▶ Disliked:
 - ▶ naming
 - ▶ Big Ideas
 - ▶ Unclear name
 - ▶ So we changed it to Course Topics
 - ▶ Navigation menu difference was a shock

Navigation and Big Ideas -> Course Topics



Course Topic Menu Shock

NOTICE: The different menu system



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Team Member: Joshua Haupt

High Fidelity: Course Topic Menu Shock



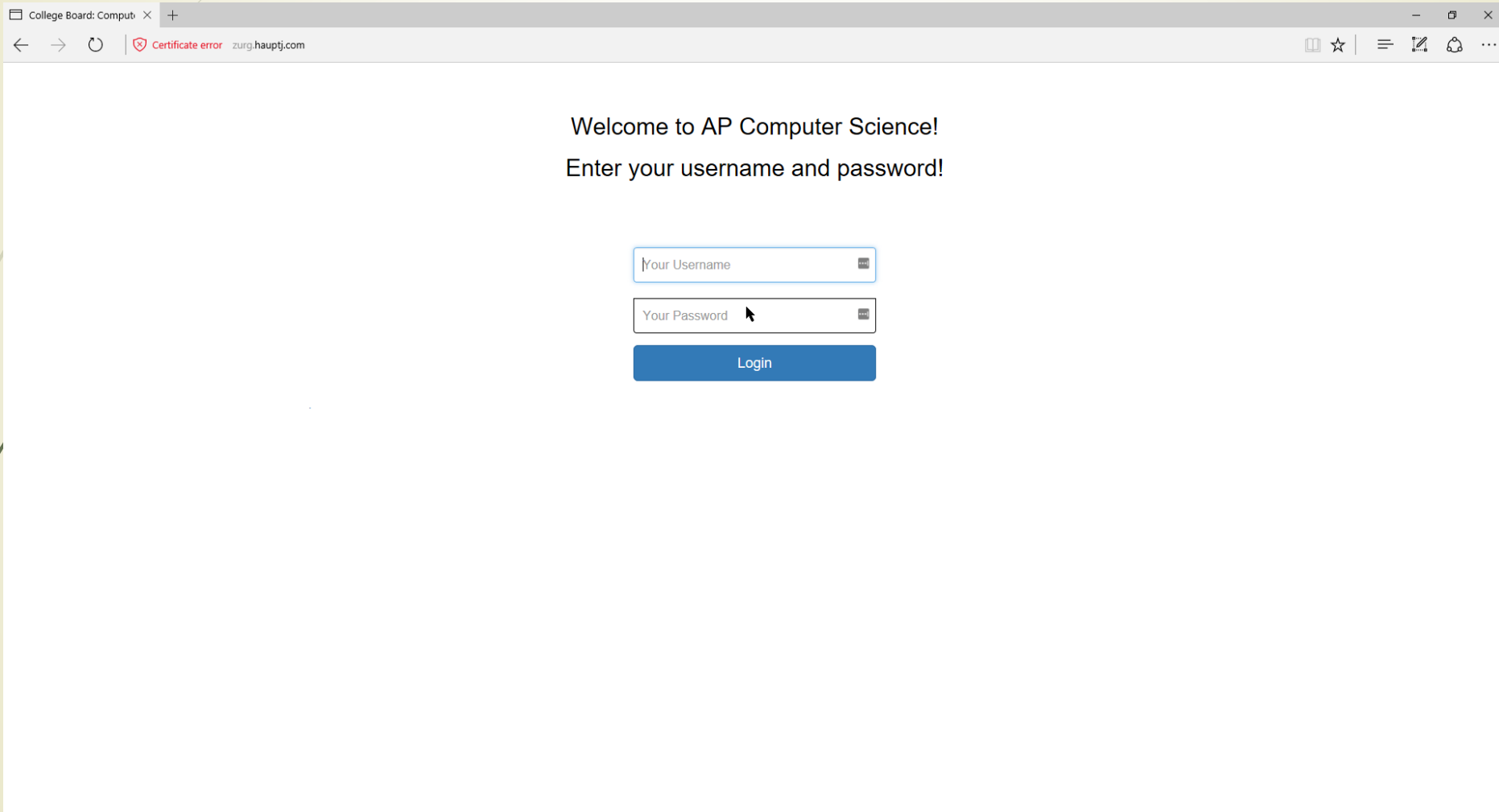
High Fidelity -> Implementation

- ▶ Dr. White's criticism:
 - ▶ To text based, NOT enough interaction
- ▶ Unfortunately, we did not add enough interaction into our final implementation.



Implementation

Login



College Board: Comput × +

← → ↻ | Certificate error zurg.hauptj.com

Welcome to AP Computer Science!
Enter your username and password!

Your Username

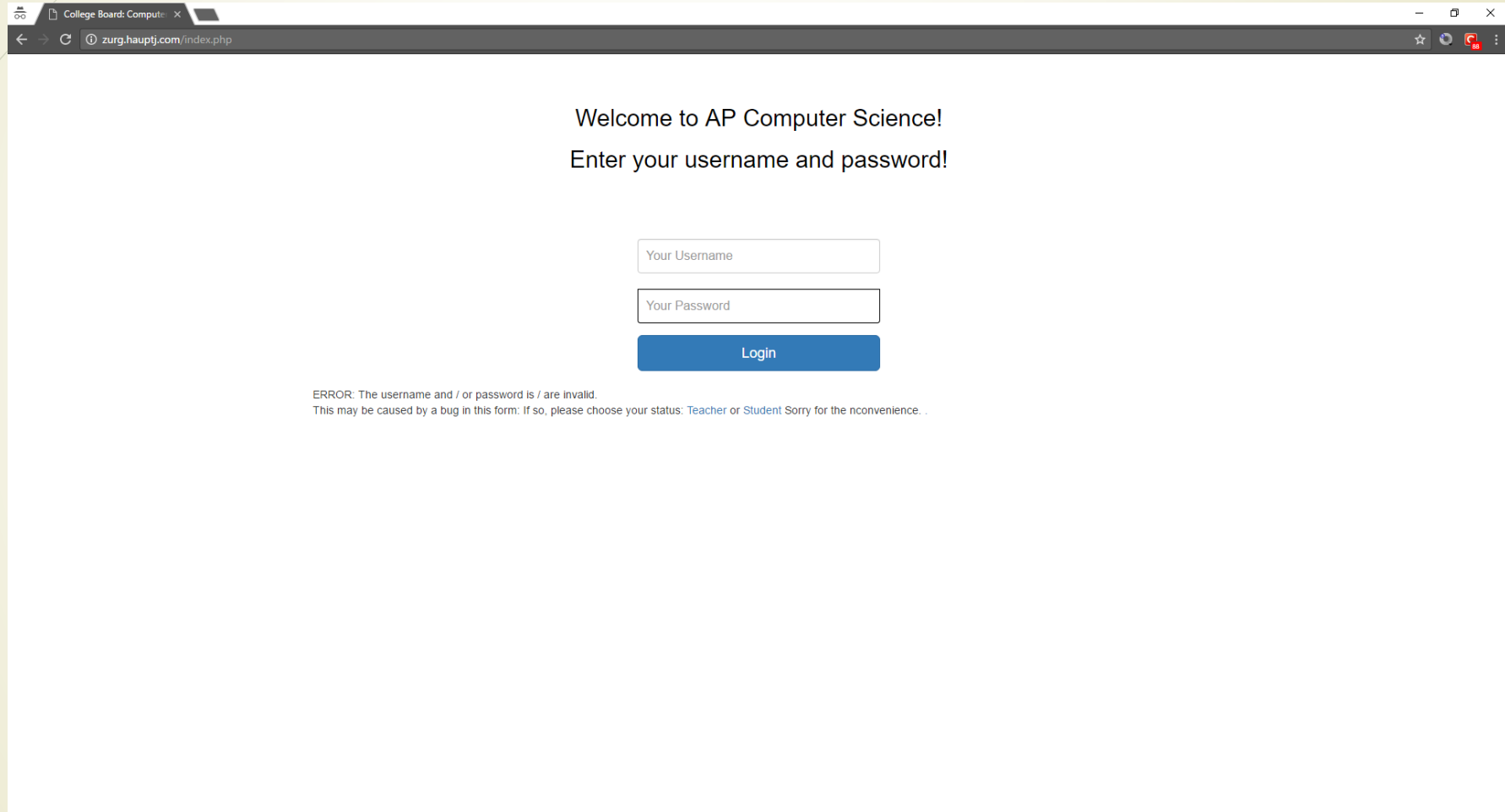
Your Password

Login

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Implementation: Login

Issue with Login Implementation



College Board: Computer Science

zurg.hauptj.com/index.php

Welcome to AP Computer Science!
Enter your username and password!

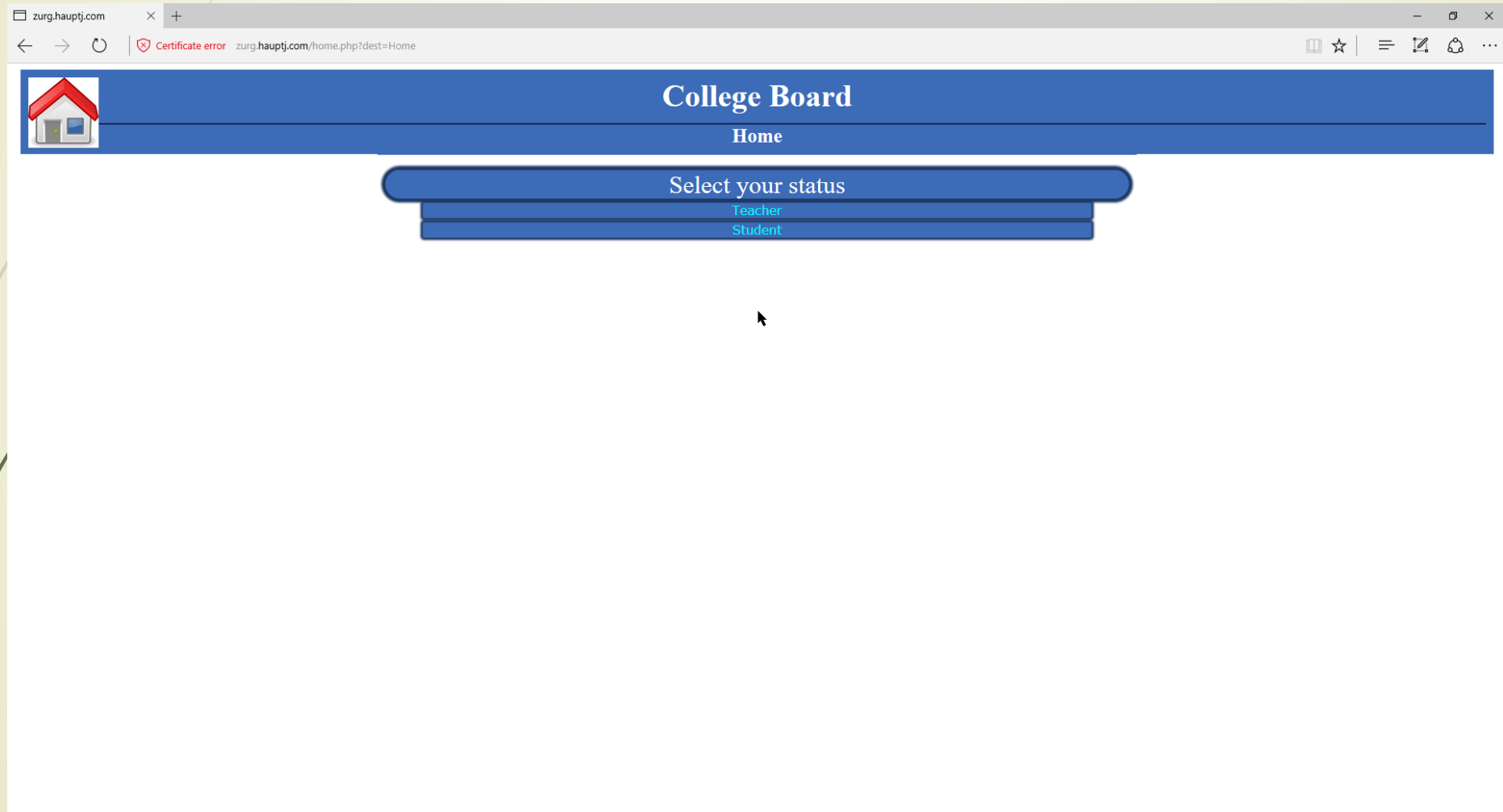
Your Username

Your Password

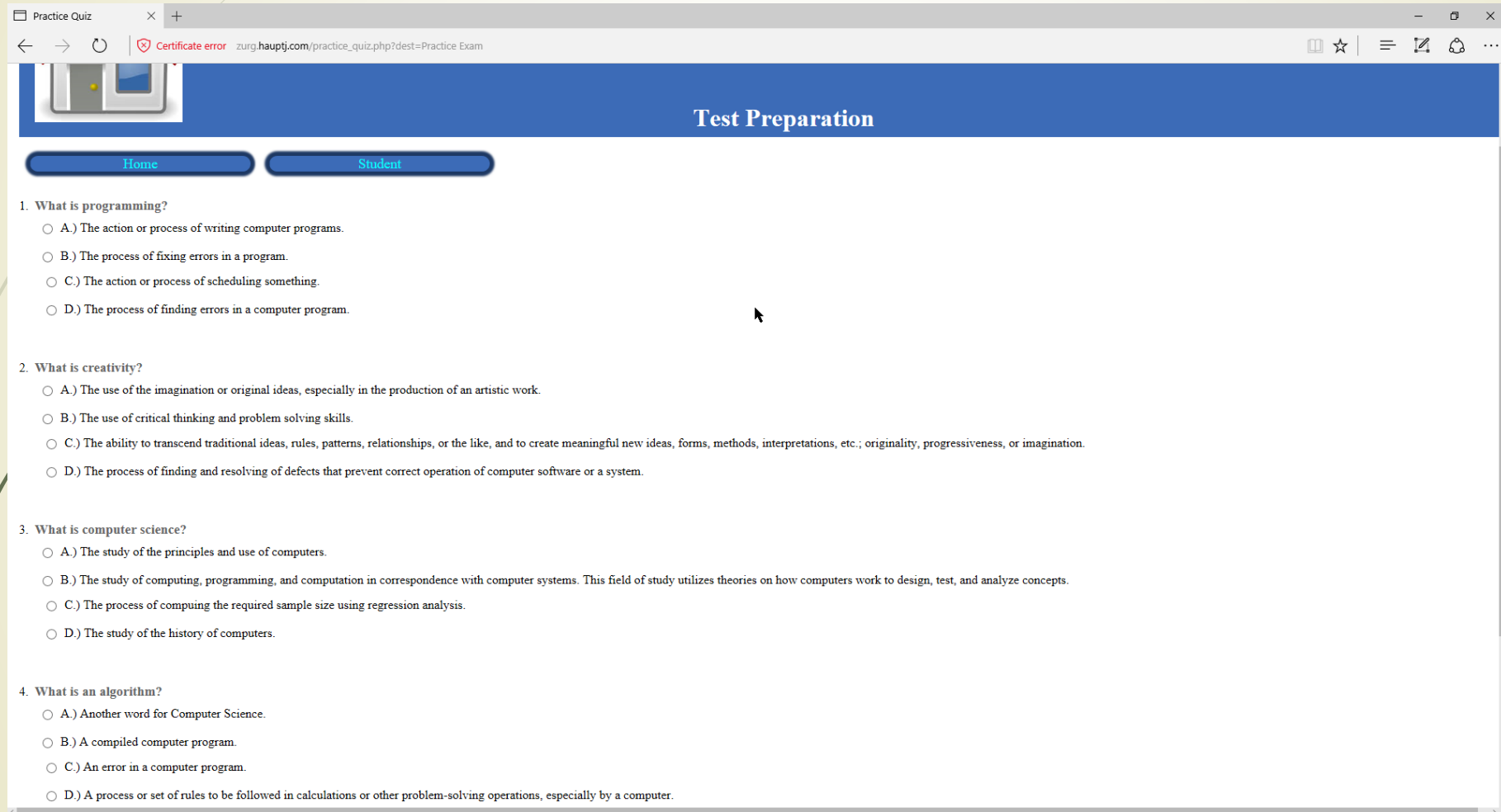
Login

ERROR: The username and / or password is / are invalid.
This may be caused by a bug in this form: If so, please choose your status: [Teacher](#) or [Student](#) Sorry for the inconvenience. .

Main Menu



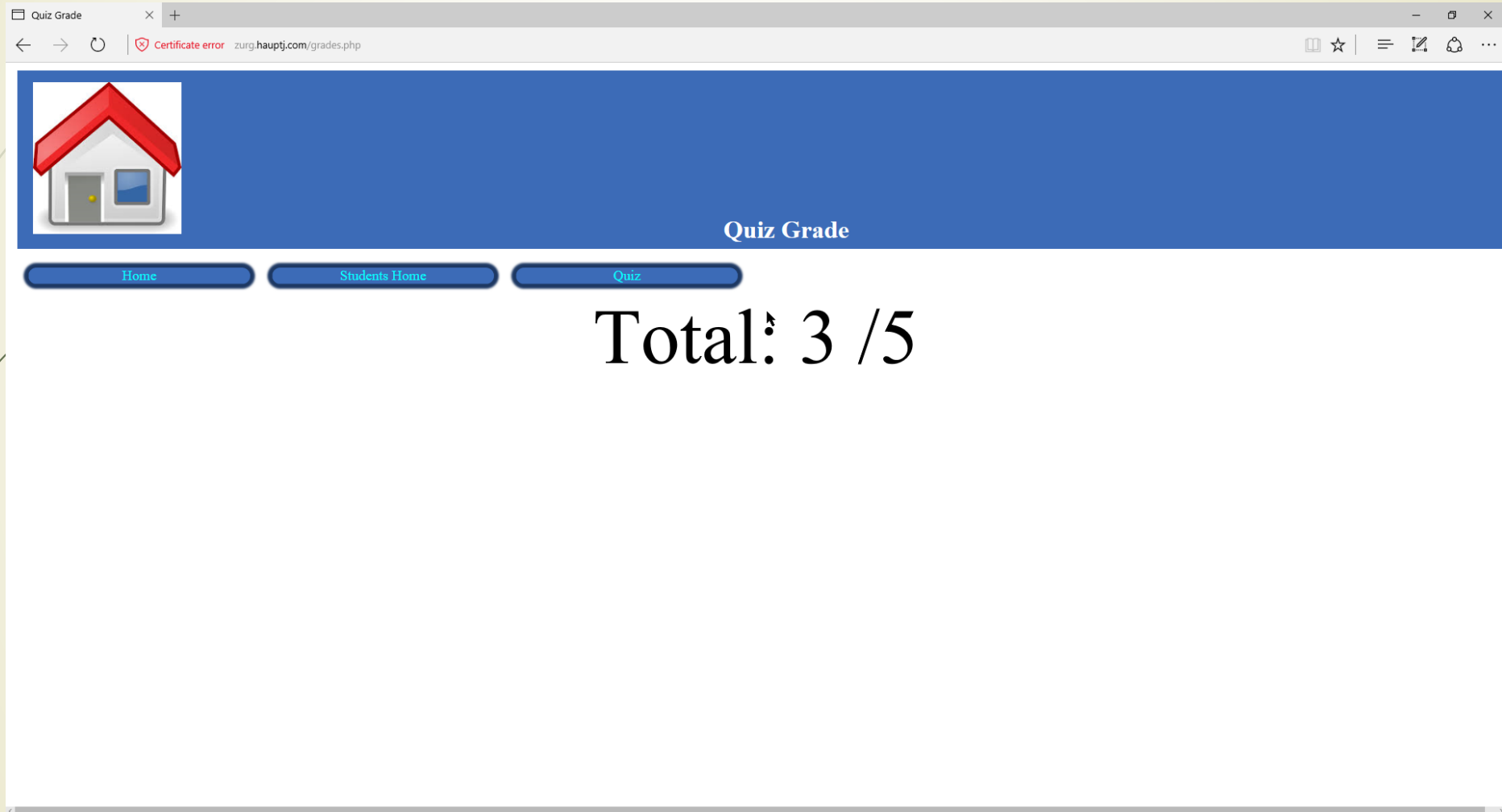
Quiz



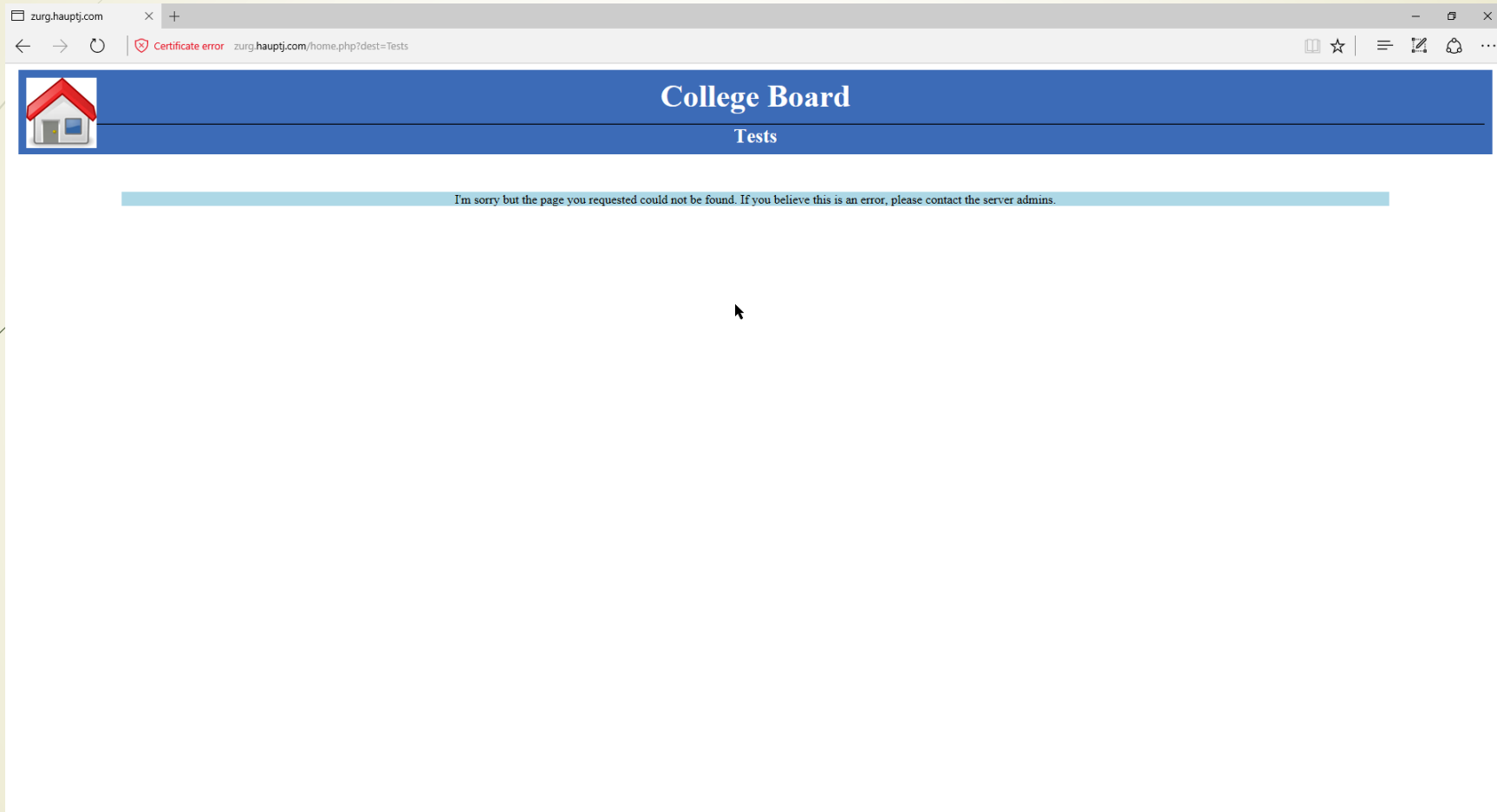
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Implementation: Quiz

Quiz Score



Incomplete Implementations



Too Text Based

The screenshot shows a web browser window with the address bar displaying `zurg.hauptj.com` and a URL with a certificate error. The page has a blue header with a house icon and the text "College Board" and "Student". Below the header are three buttons: "Home", "Student Home", and "Examples".

The main content area has a light blue background. It starts with a paragraph: "The following question uses a robot in a grid of squares. The robot is represented as a triangle, which is initially in the bottom left square of the grid and facing right." Below this is a 5x5 grid with a small triangle at the bottom-left corner (row 5, column 1) pointing right.

Below the grid is the text: "Consider the following code segment which moves the robot in the grid." This is followed by a block of pseudocode:

```
n ← 3
Repeat 3 times
  Repeat n times
    Move forward
  Turn Left
  n ← n - 1
```

The pseudocode is color-coded: control code is green, operations are orange, and blocks of code are pink. Below the pseudocode is a legend: "Control Code is shown in green, and operations are shown in orange, and blocks of code are shown in pink." Below the legend is the text: "First 3 is assigned to n" and "The next instruction to be executed will be Move forward. Since this is within a loop, it will be repeated multiple times. In our case, n."

At the bottom of the content area is another 5x5 grid, which is currently empty.

Usability Test



Tasks included:

- “Big Ideas” Activity
- Navigating to Course Description
- Completing Practice Quiz
- “Thinking Practices” Activity

Results

- SUS 90 % Confidence Interval - 72.29 to 98.71
- Users found navigation of application easy
- More interaction and questions in quiz needed

	Entire recording	Task 1	Task 2	Task 3	Task 4
Time on Task (Minutes)					
UsabilitySession1	5.78	2.41	0.45	0.64	0.43
UsabilitySession2	6.19	0.8	0.3	1.18	1.49
UsabilitySession3	5.67	0.91	0.39	0.65	0.82
UsabilitySession4	4.37	0.79	0.34	0.37	0.9
UsabilitySession5	4.83	0.71	0.34	0.33	0.7
Minimum	4.37	0.71	0.3	0.33	0.43
Maximum	6.19	2.41	0.45	1.18	1.49
Mean	5.37	1.12	0.37	0.63	0.87
Standard Dev.	0.74	0.72	0.06	0.34	0.39
90 % CI (minutes)		.435 - 1.81	.309 - .419	.311 - .957	.495 - 1.20

Post-Mortem



Nonsuccess

- Poor high fidelity prototype and final implementation
- Took time to relearn material

Success

- Completed appropriate personas, work models, and low fidelity prototype
- Improved development skills

Lessons Learned

- Good communication and time management are crucial
- Beginning phases of development are extremely important, don't push them away