



LIVABLE CITY YEAR 2017-2018  
IN PARTNERSHIP WITH  
CITY OF TACOMA

## CITY OF TACOMA

PREVENTABLE CAUSES OF STRUCTURE  
FIRE: EXPANDING AWARENESS AND  
EDUCATION

UNIVERSITY OF WASHINGTON TACOMA  
INSTITUTE OF TECHNOLOGY

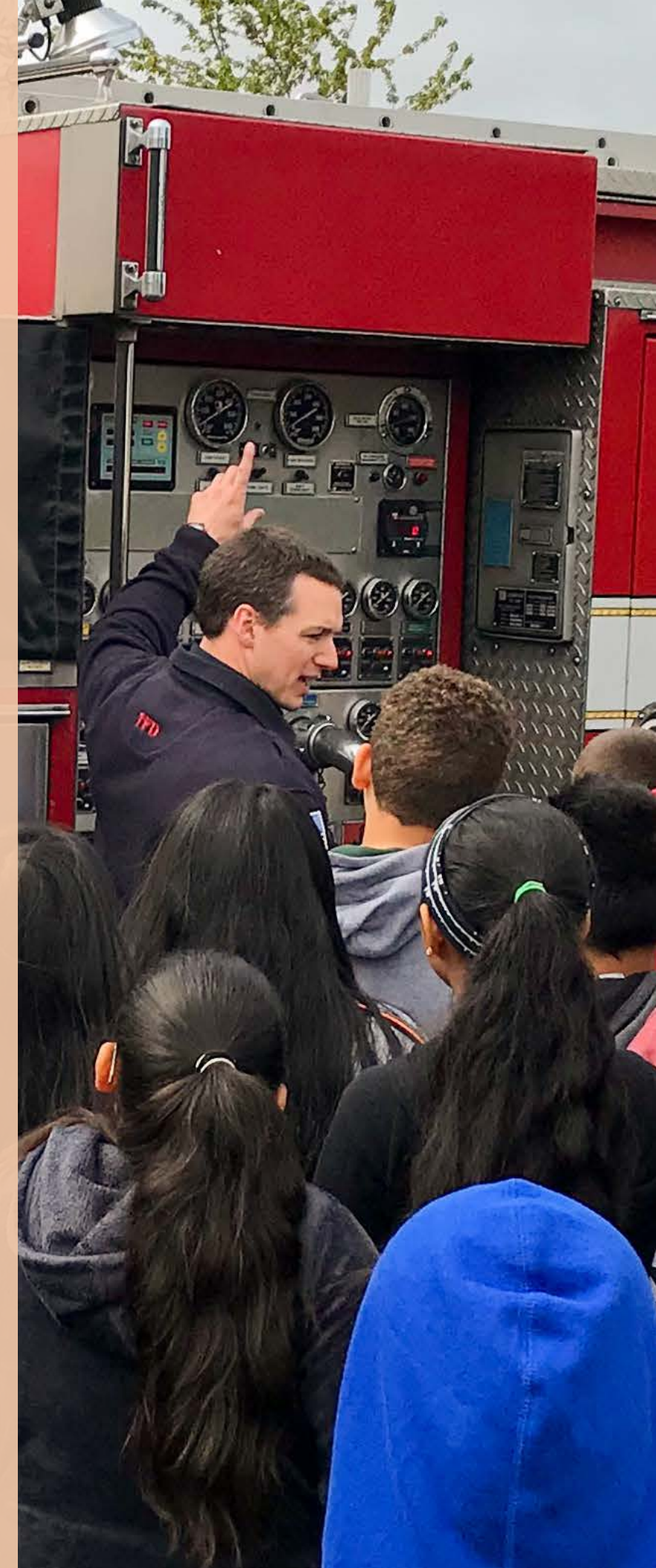
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WINTER - SPRING 2018





**LIVABLE**  
CITY YEAR

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## ABOUT LIVABLE CITY YEAR

The University of Washington's Livable City Year (LCY) initiative enables local governments to engage UW faculty and students for one academic year to work on city-defined projects that promote local sustainability and livability goals. The program engages hundreds of students each year in high-priority projects, creating momentum on real-world challenges while enabling the students to serve and learn from communities. Partner cities benefit directly from bold and applied ideas that propel fresh thinking, improve livability for residents and invigorate city staff. Focus areas include environmental sustainability; economic viability; population health; and social equity, inclusion, and access. The program's 2017–2018 partner is the City of Tacoma; this follows a partnership with the City of Auburn in 2016–2017.

The LCY program is led by faculty directors Branden Born (Department of Urban Design and Planning), Jennifer Otten (School of Public Health) and Anne Taufen (Urban Studies Program, UW Tacoma), with support from Program Manager Teri Thomson Randall. The program was launched in 2016 in collaboration with UW Sustainability and Urban@UW, with foundational support from the Association of Washington Cities, the College of Built Environments, the Department of Urban Design and Planning, and Undergraduate Academic Affairs.

LCY is modeled after the University of Oregon's Sustainable City Year Program, and is a member of the Educational Partnerships for Innovation in Communities Network (EPIC-N), the collection of institutions that have successfully adopted this new model for community innovation and change.

For more information, contact the program at [uwlcyc@uw.edu](mailto:uwlcyc@uw.edu).



## ABOUT TACOMA

The third largest city in the state of Washington, Tacoma is a diverse, progressive, international gateway to the Pacific Rim. The port city of nearly 210,000 people has evolved considerably over the last two decades, propelled by significant development including the University of Washington Tacoma, the Tacoma Link light rail system, the restored urban waterfront of the Thea Foss Waterway, the expansions of both the MultiCare and CHI Franciscan health systems, and a significant influx of foreign direct investment in its downtown core.

Washington State's highest density of art and history museums are found in Tacoma, which is home to a flourishing creative community of writers, artists, musicians, photographers, filmmakers, chefs, entrepreneurs, and business owners who each add their unique flair to the city's vibrant commercial landscape. The iconic Tacoma Dome has endured as a high-demand venue for some of the largest names in the entertainment industry.

A magnet for families looking for affordable single-family homes in the Puget Sound area, Tacoma also draws those seeking a more urban downtown setting with competitively priced condos and apartments that feature panoramic mountain and water views. The city's natural beauty and proximity to the Puget Sound and Mount Rainier draws hikers, runners, bicyclists, and maritime enthusiasts to the area, while its lively social scene is infused with energy by thousands of students attending the University of Washington Tacoma and other academic institutions.

The City of Tacoma's strategic plan, Tacoma 2025, was adopted in January 2015 following unprecedented public participation and contribution. The plan articulates the City's core values of opportunity, equity, partnerships, and accountability, and expresses the City's deep commitment to apply these values in all of its decisions and programming. Each Livable City Year project ties into the principles and focus areas of this strategic plan. The City of Tacoma is proud of its 2017–2018 Livable City Year partnership with the University of Washington and of the opportunity this brings to its residents.



# TACOMA 2025 STRATEGIC PLAN

The *Preventable Causes of Structure Fire: Expanding Awareness and Education* project supports the Education and Equity and Accessibility goals of the Tacoma 2025 Strategic Plan and was sponsored by the City's Fire Department.



**Goal #1 Livability**  
The City of Tacoma will be a city of choice in the region known for connected neighborhoods, accessible and efficient transportation transit options, and vibrant arts and culture. Residents will be healthy and have access to services and community amenities while maintaining affordability.



**Goal #2 Economy and Workforce**  
By 2025, Tacoma will be a growing economy where Tacoma residents can find livable wage jobs in key industry areas. Tacoma will be a place of choice for employers, professionals, and new graduates.



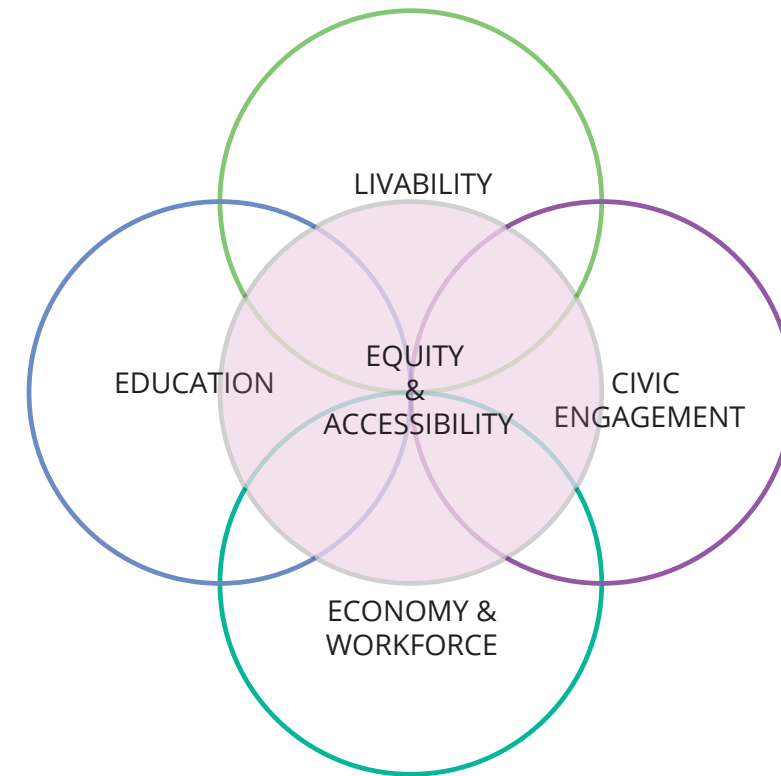
**Goal #3 Education**  
**Tacoma will lead the region in educational attainment amongst youth and adults. In addition to producing more graduates from high school and college, more college graduates will find employment in the region. Lifelong learning and access to education will be prioritized and valued.**



**Goal #4 Civic Engagement**  
Tacoma residents will be engaged participants in making Tacoma a well-run city. The leadership of the city, both elected and volunteer, will reflect the diversity of the city and residents and will fully participate in community decision-making.



**Goal #5 Equity and Accessibility**  
**Tacoma will ensure that all residents are treated equitably and have access to services, facilities, and financial stability. Disaggregated data will be used to make decisions, direct funding, and develop strategies to address disparate outcomes.**



## RESOURCES

**Tacoma 2025 Strategic Plan:** [https://www.cityoftacoma.org/tacoma\\_2025](https://www.cityoftacoma.org/tacoma_2025)

**Tacoma Fire Department:** [https://www.cityoftacoma.org/government/city\\_departments/fire](https://www.cityoftacoma.org/government/city_departments/fire)

**Livable City Year:** <https://www.washington.edu/livable-city-year/>

**UW Department of Urban Design and Planning:**  
<http://urbdp.be.washington.edu/>

This goal of this project was to create an accessible and hands-on outreach program to help the Tacoma Fire Department connect with its community. Ultimately, the Fire Department wanted to provide constituents with resources to embrace fire safety. But they also wanted to engage the community in the mission of the Fire Department: To protect people, property, and the environment.

Our process was guided by a primary finding – that fire safety education needs to be interactive and engaging in order to be internalized by Tacoma’s youth. The product supplies the Fire Department’s outreach program with an educational website with training materials and interactive online applications using fire safety activities. We developed it using the industry’s latest standards, which ensures that the program is timely, compliant, and enriching.

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The goal of this project was to connect the community with the mission of the Tacoma Fire Department: to protect people, property, and the environment.

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### PROJECT GOALS

As a team of students serving the community, the main objective for this project was to create an application that would impact the lives of the students in the Tacoma’s Public Schools. We also sought to reduce the costs for the Tacoma Fire Department’s Outreach Program.

### PROJECT OUTCOME

With this interactive application, Tacoma Public schools will have the opportunity to participate in the outreach program on their own time. As an added incentive, participating schools will compete for the big reward: A Fire Engine Visit from the Tacoma Fire Department.

### NEXT STEPS

The next phase of this application will include handing the application over to the Tacoma Fire Department so they can collect the needed data to help continue the fight against preventable fires. The application will also be available to all the residents of the Tacoma community and inspire some of Tacoma’s youth to one day become our community’s future fire fighter.



Fire truck parked outside of Boze Elementary School. JESSICA SINGO



Three hundred and two structural fires occurred in the City of Tacoma in 2017. This is a persistent problem, and the Tacoma Fire Department seeks creative ways to prevent structural fires. At the same time, the department faces financial hardship; the current budget is 15% below the 2007-2012 budget due to city-wide cuts. The Tacoma Fire Department faced a balancing act: they needed to find a way to decrease the number of preventable fires without burdening their already-lean budget.

The UW Tacoma students of the Institute of Technology sought to tackle this challenge. To do so, we created an application to connect Tacoma fire fighters and Tacoma Public School's youth. By building the Fire Department's outreach program, the Department will increase its reach to Tacoma citizens and inspire its community to take action. Our approach services to reduce the cost of the outreach program – and, at the same time, educate the community's youth on preventable structural fire awareness.

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The Tacoma Fire Department faced a balancing act: they needed to find a way to decrease the number of preventable fires without burdening their already-lean budget.

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By building the Fire Department's outreach program, the Department will increase its reach to Tacoma citizens and inspire its community to take action to prevent fires.

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A firefighter from Tacoma Fire Department shows 5th grade students how the truck works. JESSICA SINGO

The fifth grade classes at Boze Elementary School evaluated, tested, and delivered feedback throughout the development of the application. We considered a few key factors in this process:

- **Privacy:** The application does not store sensitive information on the students participating in the process.
- **Data collection:** Guided by feedback from the students, our team opted to use Vue.js, a program language that allows applications to save data for a certain duration during the interaction with the application.
- **Usability:** Students prioritized an application that was easy to understand and fun to use. We wove both of these values into our final product.

Informed by this feedback, a small team of UW students tackled the development, the design, the testing, and the implementation of the application. We divided our process into five phases:

- **PHASE 1: INITIALIZATION AND EVALUATION**
- **PHASE 2: DESIGN**
- **PHASE 3: IMPLEMENTATION**
- **PHASE 4: TESTING AND FEEDBACK**
- **PHASE 5: DELIVERY AND DEPLOYMENT**



Students at Boze Elementary test the fire prevention education app. JESSICA SINGO



### PHASE 1: INITIALIZATION AND EVALUATION

Our process began with a client meeting with Chief James Duggan of the Tacoma Fire Department. During the meeting, the team outlined the guidelines and expectations of the application, as well as our project goals and outcomes. Chief James Duggan and the Department's Project Manager, Joe Meinecke, provided recommendations connected to their core goal: to create an application for children to learn about fire safety through a gamified activity and reward system. This conversation also helped our team focus our efforts around Tacoma Public Schools, our target audience for the web application.

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Recommendations connected to their core goal: to create an application for children to learn about fire safety through a gamified activity and reward system.

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During Phase 1, the team researched other applications that address fire education. Throughout the course of this process, we noted an absence of engaging educational information for our youth on fire safety awareness. Very few resources were accessible, visually appealing, and engaging. Our team also discovered another critical issue: restrictions exist on what type of children's information can be stored. This dictated the way the team had to implement certain features and backend development in later phases.



The team strategized how to build an app that would be educational, engaging, and accessible for elementary school students. JESSICA SINGO

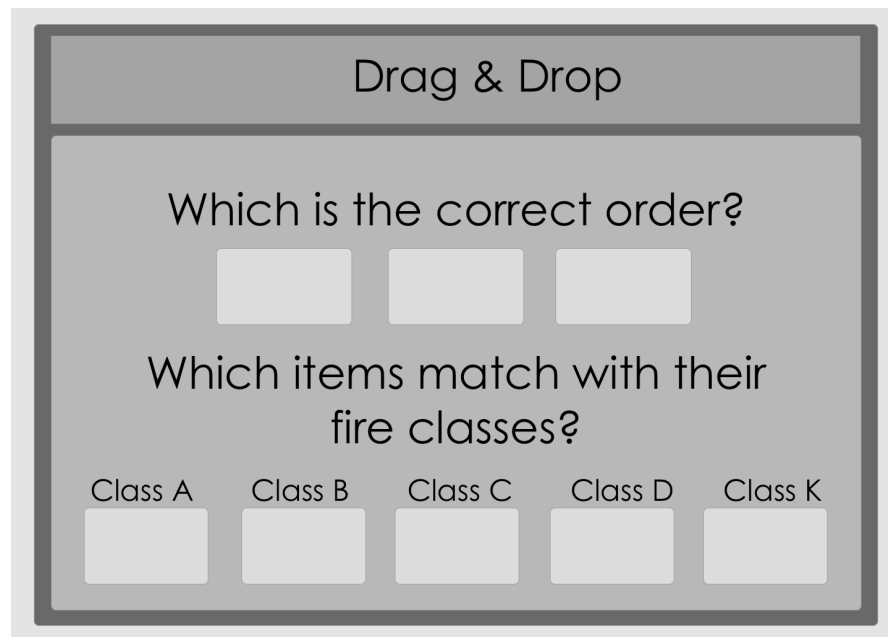
**PHASE 2: DESIGN**

During the design phase, the team collected essential information to guide the design of the application. We broke this stage into a three parts:

**Wireframe**

Before creating the complete application design, we began with a wire-frame. This practice helps developers visually organize the content for the web application, and it was essential to help us map out its structure and functionality.

**Wireframe**  
 wire-frame | ˈwaɪr(ɪ)rəʃrɑːm/  
*noun*  
 an image or set of images which displays the functional elements of a website or page, typically used for planning a site's structure and functionality.



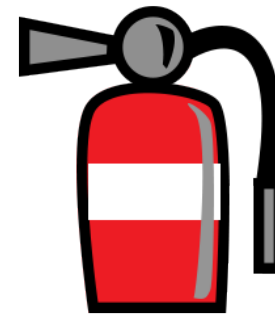
Concept sketch for drag and match page. JESSICA SINGO

**Graphic elements**

Since children are the application's core audience, we wanted to place a heavy emphasis on engaging graphics.

**Mascots**

We developed mascots and major characters that would create a visually and mentally stimulating experience for the audience.



Concept for badges. JESSICA SINGO



Final icon concept. JESSICA SINGO



Final logo concept. JESSICA SINGO

With just 10 weeks to get the project completed, the UW students worked within their tight deadline to create three activities within the application. These included a memory game, a trivia game and a drag and match game. Before creating the graphics, the team needed to lay out the aesthetics of the application. Using multiple versions of wireframes, the team began to code the basic layout and sections of the application.



### PHASE 3: IMPLEMENTATION

The implementation phase was the biggest challenge for the entire team. This was due to two primary factors:

#### Privacy

Since children’s information is very sensitive, we were cognizant of creating an application that would not store any personal details.

#### Our Solution

We addressed this by inputting sensitive information in a temporary location, which ensured that our platform didn’t collect or store data.

#### Evolving technology

Technology is continually changing, and we were committed to creating an application that would remain relevant long after our project wrapped.

#### Our Solution

After extensive background research, we settled on a new script language called Vue.js. This new language is heavily based on JavaScript. Prior knowledge of JavaScript allowed the team to integrate the new language into the application for fire awareness education.

As weeks pushed on so did the team of coders. The team knew that their application needed to be tested for feedback to ensure quality and free of and web application crashes. After developing the first version of the application, the team took the application to Boze Elementary School for testing.

```

1 export default {
2   debug: true,
3   state: {
4     "FirstName": null,
5     "LastName": null,
6     "School": null,
7     "Teacher": null,
8     "JeopardyScore": null,
9     "DragDropPass": null,
10    "MemoryPass": null,
11    "CompletedInfo": false
12  },
13  setFirst(firstName) {
14    this.state.FirstName = firstName
15  },
16  getFirst() {
17    return this.state.FirstName
18  }
19 }

```

Vue.js data storage. DEREK MILLER

```

1 <template>
2 <div id="rootContainer">
3 <div id="certificate" class="text-center p-2 visible-print-block">
4 <div class="d-flex justify-content-between">
5 </div>
6 <h1 class="align-self-end" style="">Certificate of Completion</h1>
7 <div class="img src="./img/UMLLogoPurple_150h.png" alt="Tacoma Fire Department Logo" style="width:150px"/></div>
8 </div>
9 <h1 class="display-3">{{sharedStore.FirstName}} {{sharedStore.LastName}}</h1>
10 <h2>has successfully completed the online <br>Tacoma Fire Department Safety Activities.</h2>
11 <div class="row py-5">
12 <div class="col-6 offset-3">
13 <div class="row">
14 <div class="col">
15 
16 <span>JeopardyScore</span><br>
17 <span>{{sharedStore.JeopardyScore}} pts. ({{JeopardyPercentage}}%)</span>
18 </div>
19 <div class="col">
20 
21 <span>Drag & Match</span>
22 </div>
23 <div class="col">
24 
25 <span>Memory</span>
26 </div>
27 </div>
28 </div>
29 </div>
30 </div>
31 <div class="d-flex justify-content-between">
32 <span><strong>School:</strong> {{sharedStore.School}}</span>
33 <span><strong>Date:</strong> </span>{{(new Date()).getMonth()+1}}/((new Date()).getDate())/((new Date()).getFullYear())</span>
34 <span class=""><strong>Teacher:</strong> {{sharedStore.Teacher}}</span>
35 </div>
36 <div class="d-print-none d-flex justify-content-center my-3">
37 <button @click="printCertificate()" class="btn btn-warning">Print Certificate</button>
38 </div>
39 </div></rootContainer>
40 </template>
41 </template>
42 <script>
43 import store from './store'
44 export default {
45   data() {
46     return {
47       name: 'certificate',
48       sharedStore: store.state
49     },
50   },
51   computed: {
52     JeopardyCertificate() {
53       if ((this.sharedStore.JeopardyScore / 7500) >= .9) {
54         return require('./img/badgeJepGold.png')
55       } else if ((this.sharedStore.JeopardyScore / 7500) >= .8) {
56         return require('./img/badgeJepSilver.png')
57       } else {
58         return require('./img/badgeJepBronze.png')
59       }
60     }
61   }
62 }

```

Vue.js certification code. DEREK MILLER

**PHASE 4: TESTING AND EVALUATION**

After weeks of styling the core code of the application, the team moved on to one of the most pivotal phases of the project: user testing target group feedback. The focus group comprised of 75 fifth graders from Boze Elementary School. Testing and feedback revealed that the application was not flawless. There were bugs within the application’s activities – and the most pressing issue was connected to the quiz activity. If the student submitted a question without selecting an answer, the answer would be marked as “correct.”



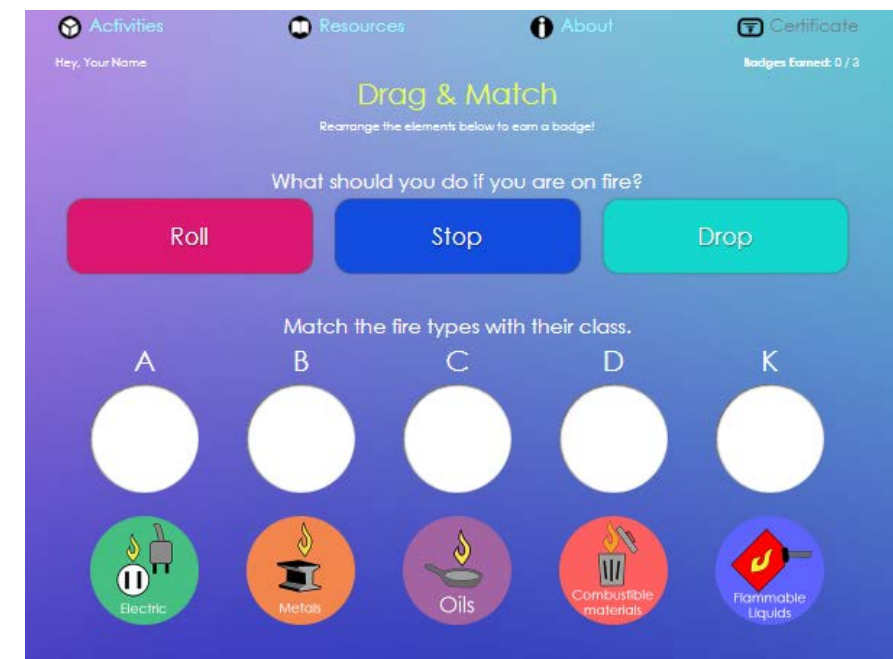
Derek Miller explains the process of the application. JESSICA SINGO



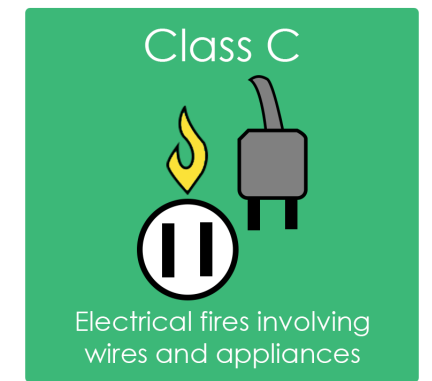
Boze Elementary students testing application. JESSICA SINGO

This issue – and our subsequent solution – serves as a poignant example of the importance of user testing. The error was due to the new code language, and our group was able to quickly resolve the issue after it was brought to our attention.

The memory game was met with overwhelmingly positive feedback during the application evaluation. The memory game is based solely on the graphic components, which resonated with the children.



Game page for drag and match. JESSICA SINGO



Game piece for drag and match. JESSICA SINGO

After the testing, the team used a survey to collect information on which game the fifth graders enjoyed the most. It also gave students the opportunity to comment on other elements of the application. This feedback provided us with valuable information on how to finesse the application. The fifth graders, for example, wanted the other activities to be more engaging and hands on. The team went back to the lab to generate more graphics. They also made the logic of each game more difficult, which encouraged educational and intrigued the young minds on fire safety and awareness.



Badge for drag and match activity. JESSICA SINGO

**Phase 4: User testing**

**Participants:** Fifth graders at Boze Elementary

**What they liked:** Bold graphics, challenging logic, interactive games

**What they wanted:** Consistently engaging and hands-on activities



## PHASE 5: PROJECT OUTCOME AND DELIVERY

In the final stage of the development of the project, students conducted a pilot test to complement the Tacoma Fire Department’s outreach program. As per our team’s recommendation, the outreach program follows the following structure:

### Introduction

The session starts with a short video that explains the application to the teacher and students.

### Reading

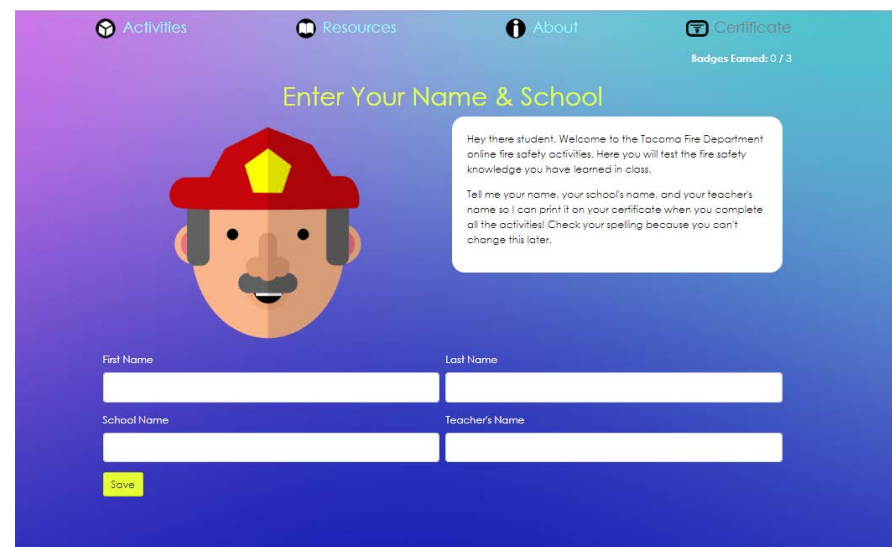
Teachers instruct their students to go online to read the training material provided by the fire department, either as a class or individually.

### Testing

Upon completion of the training material, the students are tested on the knowledge they have gained from the training modules. This is where the application – and its engaging and interactive interface – comes into play.

### Application

The application contains three activities, which the student will complete to test their knowledge. To mark their participating, they will collect badges throughout the process, which they can print out to verify their certification.



Welcome page final version. JESSICA SINGO, DEREK MILLER, JAMES ANDREWS

## Certification

To be considered for a Fire Engine visit from the Tacoma Fire Department, students must turn in a certificate of completion to their teachers. Once the teachers collect the certificates, they submit the bundle to the Tacoma Fire Department’s Outreach Coordinator. The Coordinator will tally up the certifications.



## Fire Engine Visit

The schools with the most participation will be selected to have a visit with the fire truck. After being selected for the Tacoma Fire Engine visit, the students are then invited outside to meet their local fire fighters for the fire engine visit. The fire fighter reinforces the material learned through some questioning and answers. The fire fighter will talk to the children about their experiences, the impact that the children can make, what it is like to be a fire fighter, and the importance of fire safety. The children even get an opportunity to spray the fire hoses.



Fifth graders line up to spray the fire hose. JESSICA SINGO

Fires are preventable. Combining its outreach program this application, the Tacoma Fire Department can reduce both the cost and losses associated with structural fires. This application seeks to provide the necessary education to prevent fires through an educational yet engaging experience. Students can learn more effectively in a positive and engaging atmosphere. This application provides the students with basic fire safety knowledge which they will take into their future lives. We hope the young students share and educate others with the information the gain from the application on fire safety.

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This application seeks to provide the necessary education to prevent fires through an educational yet engaging experience.

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*This app gives students the tools they need to be fire prevention stewards in their community.* JESSICA SINGO