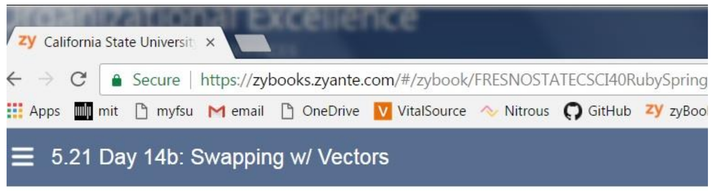
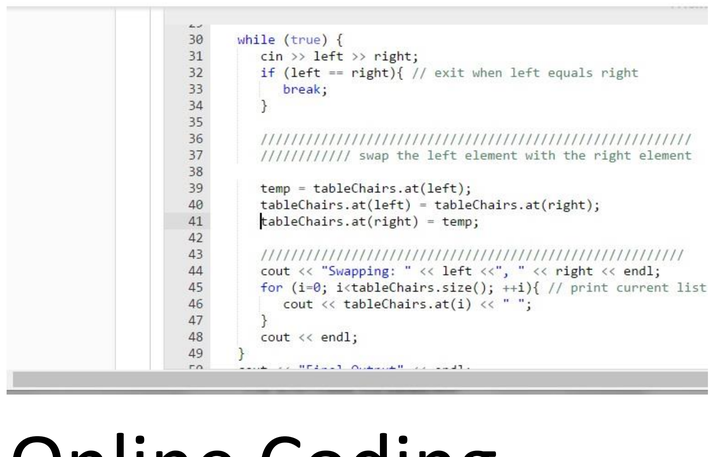
Improving Computational Thinking w/ Coding In Cloud





```
while (true) {
   cin >> left >> right;
   if (left == right){ // exit when left equals right
      break;
   }

   ////////////////////////////////////////////////////////
   /////////// swap the left element with the right element

   temp = tableChairs.at(left);
   tableChairs.at(left) = tableChairs.at(right);
   tableChairs.at(right) = temp;

   ////////////////////////////////////////////////////////
   cout << "Swapping: " << left <<", " << right << endl;
   for (i=0; i<tableChairs.size(); ++i){ // print current list
      cout << tableChairs.at(i) << " ";
   }
   cout << endl;
}
```

Online Coding Environment

Coding can only be learned by doing. Getting students coding and reviewing code is critical.

Course redesign puts coding focus onto an online coding environment included with online textbook.

This environment is available from any internet enabled device, allowing students to maintain close contact with coding.

Computational Thinking and Computer Science for EVERYONE!

Class Coding:

With always available coding environment, together with Tablet course, a variety of coding activities were developed and added in class.

Coding Examples: Whenever code is presented in class, an executable example is included in book that can be modified, tested, further documented, and otherwise utilized for better understanding.

Coding Challenges: Leaving some code examples incomplete enables students to test understanding by completing example, executing code, and displaying result.

Lab Coding:

Lab coding activities utilize same online coding environment, providing all students with the same environment used in class example.

Homework Coding:

Using the same online environment, a variety of autograded assignment were also developed for students to solve outside of class/lab.

The homework coding challenges usually build directly off the work students were doing in lab.

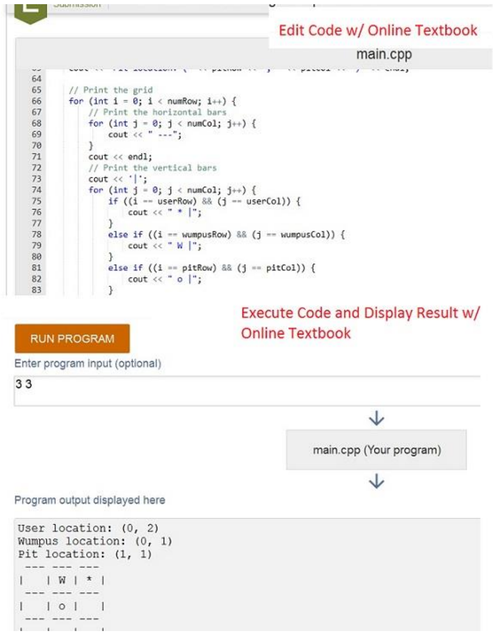
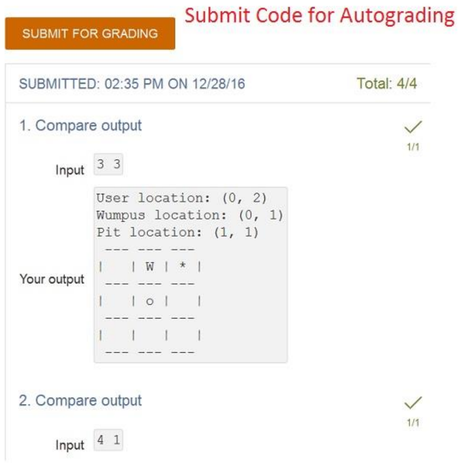
Teamwork:

Developing complex abstractions required to do problem solving in code is facilitated through discussions. Discussing code facilitated understanding by everyone.

Labs were developed to facilitate student peer discussions. These labs would operate in two parts. During part 1 (first week) students would work alone and attempt to initiate lab. During part 2 (second week) students would come together into small groups to discuss their code and difficulties encountered, then work together to complete lab. Lab instructors would then meet with the small groups and further disucss code and challenge results.

Cloud coding improves access enabling more practice.

Practice, Practice, Practice!!!

Preliminary results indicate strong improvement in comprehension of core coding concepts.

Future work includes developing more materials to facilitate further improved comprehension of advanced coding concepts, along with further analytic analysis.