**UBCO, CMPS Department, Computer Science** 

# LearnCoding – Adaptable, Expandable Learning Platform Dr. Abdallah Mohamed (PL), Thomas Van De Crommenacker (main dev)

## What is LearnCoding?

The lessons themselves consist of various pages Text, Images and Videos LearnCoding is a teaching and learning platform created with flexibility and extensibility in mind. of content, known as topics. These topics are Text articles allow an instructor to explore the currently one of three types: lesson's topic. This may include examples with code, case studies, videos and images, specific Designed to create content that is accessible to Text (including images, videos, and code) applications and more.

anyone regardless of field of study, level of expertise or what language you speak.

All the topics can be easily navigated to using Our platform consists of Courses that cover the menu in the sidebar. They are completely broader concepts within the realm of computer accessible at any point since the aim is to allow the user learn whatever they're interested in. science and programming. For example a course might cover Data Structures. Within the courses there are any number of Lessons that teach and The pages themselves are created using blocks of content that can be further configured to test the student on parts of of that concept. For change with given set of customization options. example the Data Structures module may contain lessons on Binary Trees or Linked Lists. All the lessons can be accessed at any time and in any order for easy access.

## What makes it different?

### Extensibility

Although initially a lesson may only contain basic c in English, for the Java programming language and using examples from Computer Science. Instructor able to contribute to lessons with translations, expe in other programming languages or disciplines or o relevant information. This allows the existing lessor serve as repositories of information that naturally g highly accessible and informative.

### Customizability

Naturally, as the lessons grow to contain more optic for the user to choose from, the lessons become highly customizable to fit any student's need regardless of spoken language, level of expertise in a specific programming language or their field of study.



## What's Inside a Lesson?

- Coding Quizzes
- MCQ and Short Answer Quizzes

## **Building Blocks**

### Quizzes

The Quizzes can either be Coding Quizzes or MCQ and Short answer. The Coding Quizzes verify the user's code using unit tests written by the instructor.

## **Code Blocks**

Similar to text content, code content can be added to lessons using code blocks within the lesson editor that have a code editor. Code blocks can be used by the student to test code or visualize code execution, step by step

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	HOME DOCS TOUR		
	Dashboard	Return Values	
	"Hello, World!"	A method may return a value using the return statement.	
	Variables and Datatypes >	Example	
	Operators >	Let's say you want a method getMax() that finds the larger of two numbers and returns it. This is similar to printMax() method, except that the method returns the result instead of printing it.	
	Basic Input and Output >	<pre>1. static int getMax(int x, int y) { 2. if(x&gt;y)</pre>	
	Selection >	3. return x; 4. else 5. return y;	
	Loops >	<pre>6. } 7. public static void main(String[] args) {</pre>	
	Basic Data Structures: Arrays	8. System.out.println("Welcome"); 9. System.out.println(getMax(18, 19)); // prints 19 10. }	
	Basic Data Structures: Lists >		
ntent	Functions ~	Preview Visualization	
	> Introductory Problem ~	Let's see how above program works:	
	What is a Function?	• Line 8: first line to run. Prints "Welcome".	
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Above you can see the current layout of a lesson with two different customization option sets selected. English and Java on top and French Python below. The student can navigate to different topics in a lesson, or other lessons in the module using the sidebar on the far left. The dropdowns for the customization of the lesson are found at the top of the page.



## **Tracking Progress and Badgr**

As the user completes content in a Course the system will track their progress. In order to complete a module a user must complete all the content that actually tests their new knowledge, that is to say they must complete all the Quizzes in a module.

Upon completing all the basic quizzes in a course they will be awarded a Badgr OpenBadge certifying their accomplishment. Upon completing all the advanced quizzes they are awarded an advanced Badgr OpenBadge.

## **Case Study**

The system was piloted in CS1 courses (700+ students). A questionnaire using the Likert scale was used to collect student feedback. Regressions analysis was used to determine relationships between customizability and reported understanding and interest. All indicated statistically significant positive relationships.

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Example Regressions Perceived customizability of prog-language v. understanding (p-val = 0.000336). Perceived customizability of programming language v. understanding (p-val = 3.73E-10).

## **Tech Stack**

The application has a Laravel PHP backend, MySQL database, jQuery was used for the front end. User code is tested using the Judge0 API running in a docker container. All of which runs on a RHEL8 VM on UBC servers.

#### Acknowledgements

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