Coding Development LMS Requirements

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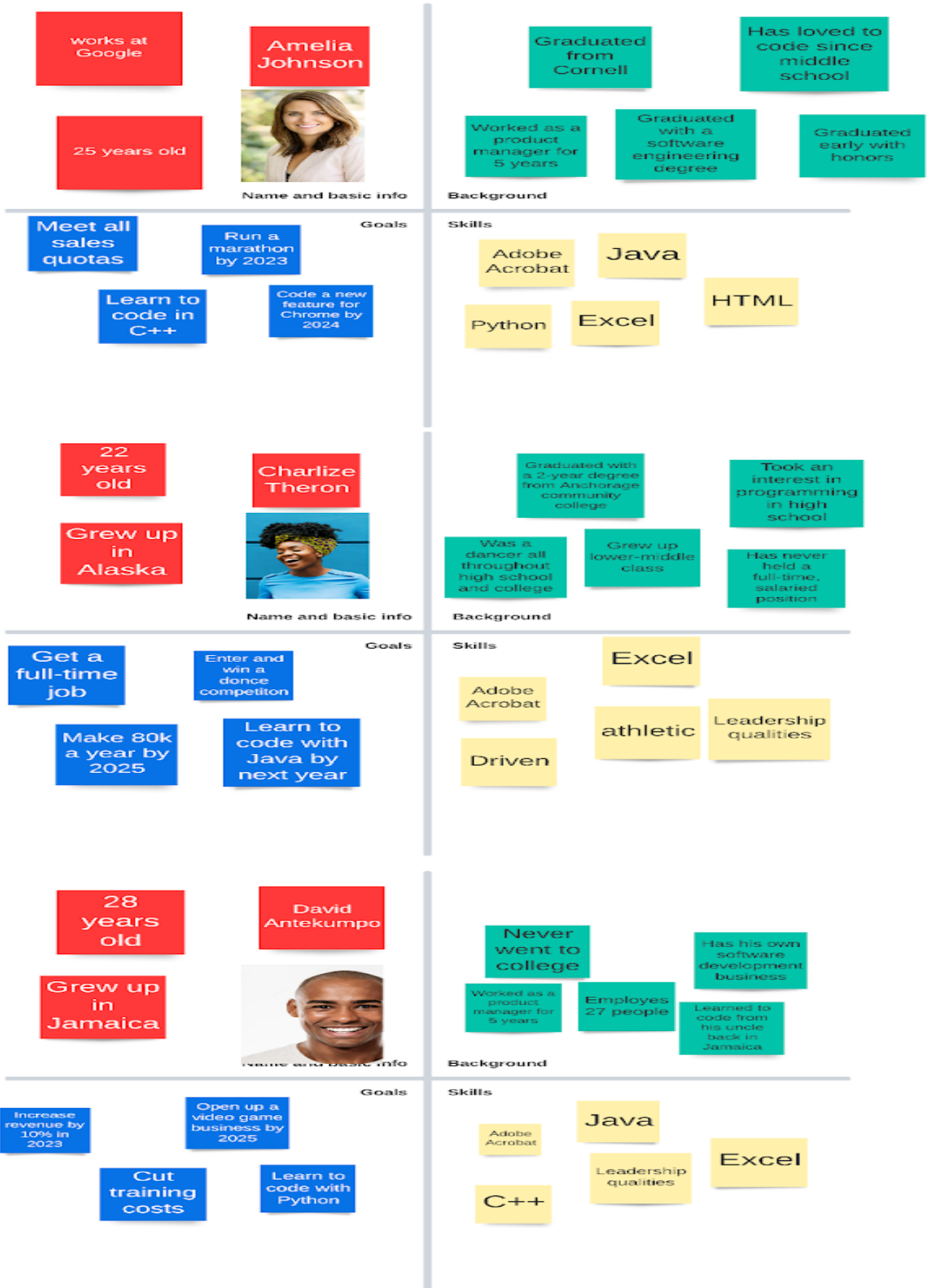
Date: 1/22/2023

Version 1

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Introduction

The purpose of this project is to build an LMS that streamlines learning for certain coding languages. The goal of this project is to create a system that effectively teaches the user the ins and outs of coding in several languages, tracks their learning, and provides useful feedback on their education process. This software can be used by a casual user who wants to learn more about computers or a firm looking to cut down on training costs. Firms who operate in software development or cybersecurity fields usually have lengthy training programs for new recruits. These industries come with a high risk; the smallest errors could result in casualty. We hope to lower the cost and time commitment it takes to train developers, as well as improve the quality of education.

Amelia Johnson

Name and basic info

- works at Google
- 25 years old
- Amelia Johnson

Background

- Graduated from Cornell
- Has loved to code since middle school
- Worked as a product manager for 5 years
- Graduated with a software engineering degree
- Graduated early with honors

Goals

- Meet all sales quotas
- Run a marathon by 2023
- Learn to code in C++
- Code a new feature for Chrome by 2024

Skills

- Adobe Acrobat
- Java
- HTML
- Python
- Excel

Charlize Theron

Name and basic info

- 22 years old
- Grew up in Alaska
- Charlize Theron

Background

- Graduated with a 2-year degree from Anchorage community college
- Took an interest in programming in high school
- Was a dancer all throughout high school and college
- Grew up lower-middle class
- Has never held a full-time, salaried position

Goals

- Get a full-time job
- Enter and win a dance competiton
- Make 80k a year by 2025
- Learn to code with Java by next year

Skills

- Excel
- Adobe Acrobat
- athletic
- Leadership qualities
- Driven

David Antekumpo

Name and basic info

- 28 years old
- Grew up in Jamaica
- David Antekumpo

Background

- Never went to college
- Has his own software development business
- Worked as a product manager for 5 years
- Employes 27 people
- Learned to code from his uncle back in Jamaica

Goals

- Increase revenue by 10% in 2023
- Open up a video game business by 2025
- Cut training costs
- Learn to code with Python

Skills

- Adobe Acrobat
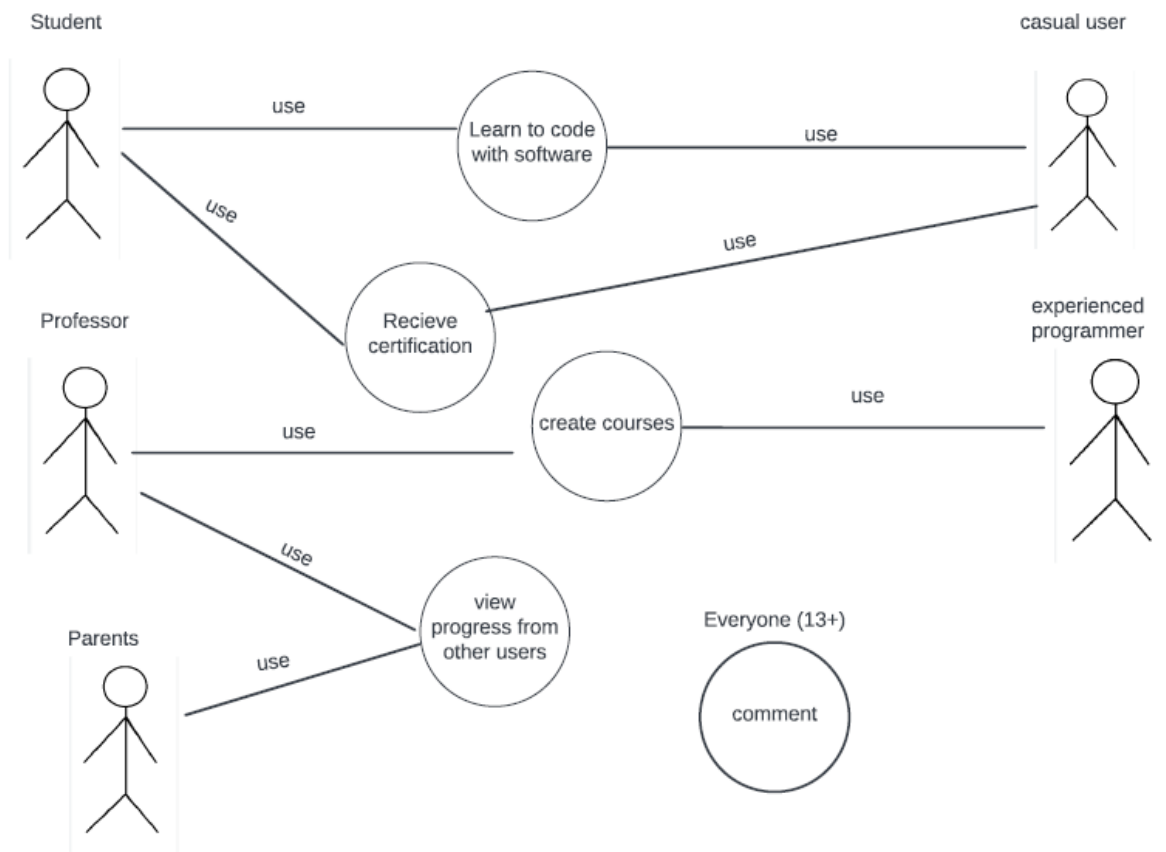- Java
- Leadership qualities
- Excel
- C++

Restraints

We have a budget of $0. We have a time constraint of about 2-3 months, and we have to juggle other projects while working on this one. We have never worked on an LMS before, so we may have to take some liberties in interpreting the specifications.

Overall Description

Users will be able to access our LMS by downloading the program onto their local devices.

The user will be able to access multiple learning courses for popular programming languages

such as Java, Python, C, and C++. Learning courses will have a course curriculum which gives the

user access to information and education about the programming language as well various

assessments to test the users knowledge. Users will only be able to move on in a course if they

are able to pass the assessment. The program will be able to store and access data collected on

the users current learning progress in different courses.

Use Cases

Student

casual user

use — Learn to code with software — use

use

use

Professor

experienced programmer

Recieve certification

use — create courses — use

use

view progress from other users

Parents

Everyone (13+)

use

comment

Functionality Requirements

ID	NAME	Description	Priority (1 = highest, 3 = lowest)	Rationale
1	Account creation	The user shall create an account using the following information:	1	The user will need to have an account to log in and use the LMS.
1.1		- First name (Required)		
1.2		- Last name (Required)		
1.3		- Username (Required)		
1.4		- Date of birth (Required)		
1.5		- Email (Required)		
1.6		- Password (Required)		
2	Login	The user shall be able to login to a previously created account using the following information:	1	The user will need to be able to login more than one time
2.1		- Username or email		
2.2		- Password		
3	Courses	The user shall be able to enroll in courses for the following programming languages:	1	These are the most popular programming languages and should be the minimum of what the LMS has to offer.
3.1		- Python, JavaScript, Java, C++, and C.		
4	Course limit	The user shall be able to be enrolled in an unlimited number of courses at a time.	3	The user will be able to learn any number of topics at the same time depending on what they want to learn
5	Course recommendation	Upon account creation, the system shall recommend courses for the user to enroll in.	3	The user will be able to learn the language most suited to them without having to know much about programming
6	Order of recommended courses	Courses recommended to the user should be ordered by popularity of the language taught by the course.	3	The user will be reccomended the most popular languages first as they can be considered the most useful to learn
7	Search	The user shall be able to search for courses.	3	The user will need to be able to find a specific topic they are interested in
8	Assignment cap	The system shall allow courses to have an unlimited number of assignments.	3	A course creator will need to be able to create as many assignments as they need to teach content
9	Progress percentage	The system shall display the users progress in each course as a percentage.	3	The course should display a percentage so the user knows how much content they have progressed through
10	Progress percentage basis	Course progress percentage shall be based on number of subjects completed.	3	

11	Subject quiz	The user shall take a quiz for each subject of a course.	2	Having a quiz at the end of each subject will allow the user to know if they've learned everything before moving on to new subjects
12	Subject quiz type	Subject quizzes shall be multiple choice.	2	Multiple choice is the desired format for quizzes as it will make it very easy to determine the users grade.
13	Subject quiz grading	Subject quizzes shall be graded autonomously by the system.	2	Our LMS will be made for many users so the system will need to evaluate users without human interference.
14	Subject quiz attempts	The user shall have unlimited attempts to pass subject quizzes.	3	Users should never become unable to continue through a courses material.
15	Quiz passing score	The system shall consider a subject complete if the user passes the subject quiz with a score of 80% or higher.	3	A score of 80% demonstrates the user understood the material they were taught.
16	Quiz gamification	The system shall display a rocket ship launching animation when the user passes a quiz with 100% accuracy.	3	The user will get a feeling of satisfaction when passing a quiz with 100% accuracy
17	Course tests	The user shall take a certification test at the end of each course.	2	The test will determine if the user should be certified in that langauge.
18	Course test type	Course certification tests shall be multiple choice.	2	Multiple choice is an appropriate way to measure the users knowledge.
19	Course test grading	Course certification tests shall be graded autonomously by the system.	2	A course certification test should be graded automatically so it can provide the score to the user after completion
20	Course test attempts	The user shall have unlimited attempts to pass course tests.	3	Users should never become unable to pass a course.
21	Unlocking course test	The system shall allow the user to take the course test once they have passed all subject quizzes in the course.	3	The user will need to progress through each topic before reaching the final test to ensure they went through all of the course material
22	Course test passing score	The system shall consider a course complete if the user passes the course test with a score of 80% or higher.	3	A score of 80% demonstrates the user understood the material they were taught.
23	Course certificate	The user shall recieve a course certificate upon passing the course test. The certificate shall include the following information:	3	The user needs some form of proof of completion of the course which is provided by a certificate
23.1		- Users first and last name		
23.2		- Course name		
23.3		- Date		

Link to original spreadsheet:

https://docs.google.com/spreadsheets/d/1u8axNldgH1mxgMvWy-_AXwWuXG65gTwkSfj64FnV

wYI/edit?usp=sharing

Non-functionality requirements

★   Look and feel requirements

    ○   The user shall receive a virtual certificate upon mastery of a concept or language

    ○   The user shall have an unlimited amount of time to complete a course or take a

        quiz

    ○   The user shall retain the ability to take a course regardless of how poorly they

        scored on a previous try.

    ○   The system shall target novice programmers when launched and marketed

★   Usability requirements

    ○   The system shall rank course based on their popularity among practicing

        programmers

    ○   The user shall be able to take a placement test to determine their starting point

        in the course

    ○   The system shall be used by any user regardless of age, race, or gender for free

★   Performance requirements

    ○   The system shall display a percentage counter of a user's mastery with any given

        concept

★   Maintainability and support requirements

    ○   The system shall allow users to make courses after they apply to the site and are

        certified by staff

★   Security requirements

    ○   The system shall have Duo-Factor authentication for the user's password

★ Cultural requirements

○ The system shall block engagement with the comment sections of the forums for

children age 12 and under.

★ Legal Requirements

○ The system shall maintain the user's certification status in a given language

regardless of how long ago the user was certified or how many new features

come out pertaining to that language.

Definitions and Acronyms

LMS: Learning Management System

Programming language: A set of words and rules that can be strung together to create a computer program. Each language is similar with small changes in syntax and reserve words

Syntax: The rules which govern the use of a programming language. Think of the syntax of whatever language you speak

Reserved Words: Words that perform special actions when used in a program

API: Application Programming Interface

UI: User Interface

Competitive Analysis

Competitor 1: Pluralsight
https://www.pluralsight.com/
"The technology workforce development company"

Target Audience
- Primarily targeting enterprise audience
- Software development teams
- Businesses
- University Students

User Home Page
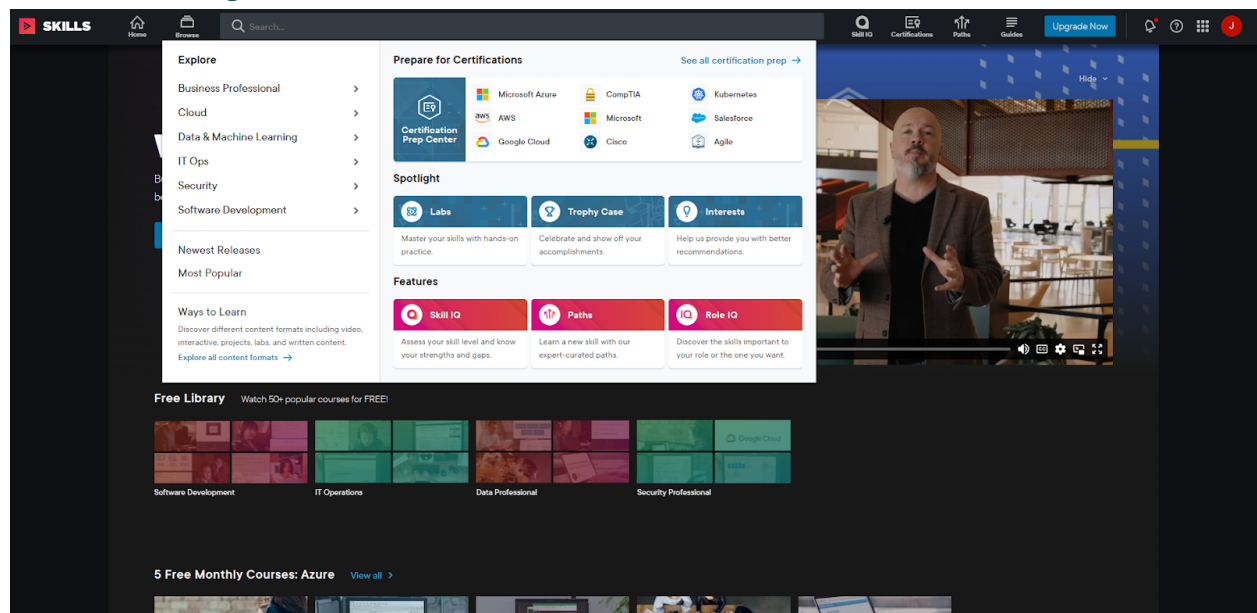
The home page for a user contains a browse button where the user is able to look through available course paths and certifications. For the software development tab, it is organized by use case, including examples such as game development, web development, and general languages. They also include popular course paths, as well as new releases, which may be appealing to users.

Learning Paths
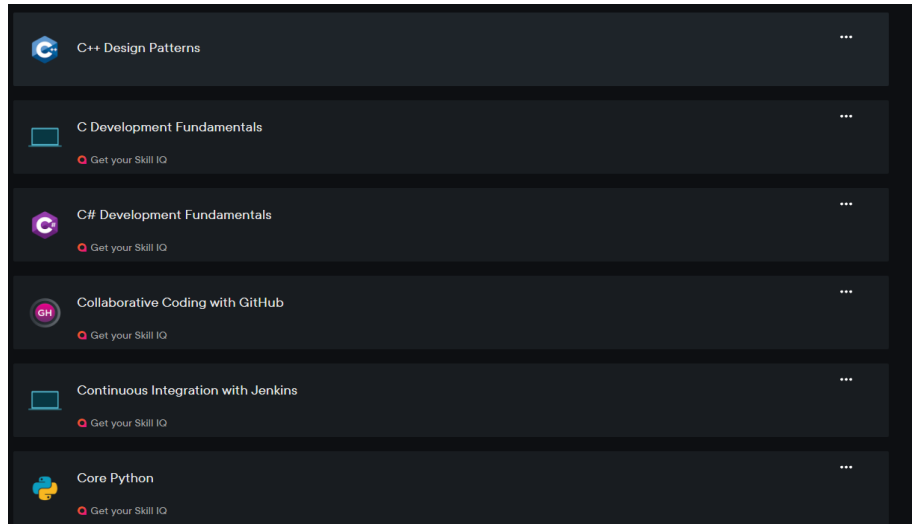
One of the main selling points of Pluralsight is their Learning Paths. These paths are curated for specific goals such as developing api's with ASP.NET or learning C# development fundamentals. A potential problem with pluralsight's learning paths is the sheer volume of paths to choose from. It may be too difficult for the end user to find a course that fits their needs with the amount of options present.

Course View

The main course view provides information about the course author, rating of the course, estimated completion time, and more. The course is cleanly organized and provides a table of contents, description, exercise files, and practice questions to test the user's skills.

Course Features
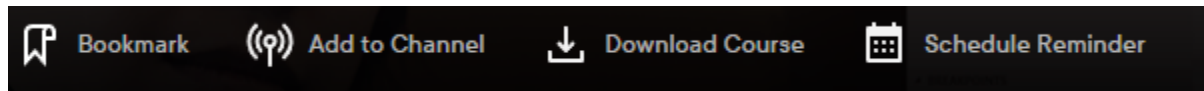
Each course has a few accessibility features to help improve the user's learning experience. The user can bookmark a course to show up on their homepage, download the course for their offline course viewer, and even schedule reminders for tasks that will integrate with outlook and google calendars. The add to channel feature allows the user to add content in a personalized group to share with others who may be interested in following the same path.

Course Video View

The view when selecting a video provides a table of contents with timestamps to navigate through the section in the video.

Additionally, there is a notes tab for the user to write important information they might want to study or keep track of.

User Profile

Jakub Sykora

Share · Edit profile · View as public

2 Interests

Activity insights

View time ⓘ

2ₕ 52ₘ
Total content watched

Sep   Oct   Nov   Dec   Jan

Learning streaks

Monthly | Current

1/3
day

Nice job! You are on your way to breaking your best streak.

Weekly goal ✎

You haven't set a goal yet. Set a weekly goal to begin tracking and viewing your progress.

Set weekly goal

Most viewed subject
(Last 30 days)

Object oriented program...

The user profile page contains statistics about your learning such as view time, most viewed subject, as well as badges the user has earned from progressing through a course. On this page, the user can set a weekly goal for time spent learning on the service.

Competitor 2: Coursera

https://www.coursera.org/

"We envision a world where anyone, anywhere has the power to transform their life through learning."

Target Audience
- **Primarily targeting individuals**
- **Students**
- **People looking for a career change**
- **Businesses**

User Home Page
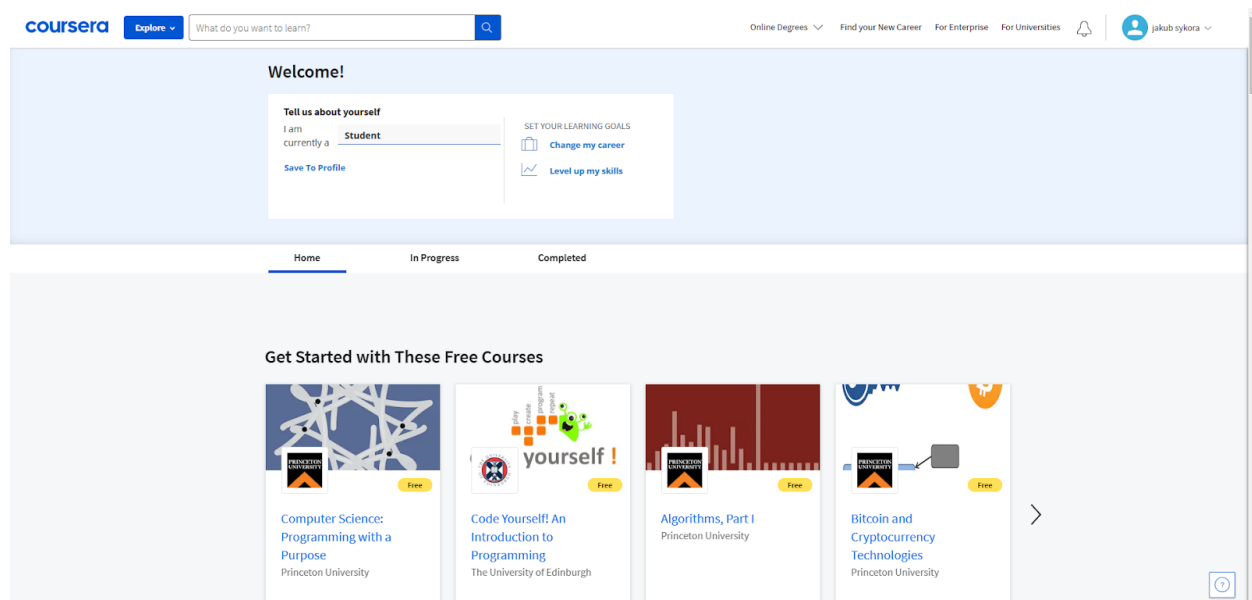
The main user homepage has a simple UI with recommended courses at the bottom along with a search bar at the top to search for published courses. The UI is easy to navigate and isn't cluttered with too much information.

Course Paths

The find your new career button along the top, along with the search bar, are the main methods for searching for a learning path to follow. There aren't a great deal of options, however many of the options provide multiple different courses that fit the career path. The main course search bar allows the user to search for individual topics

Course View

Inside of a course, as seen above, there is a course material tab that displays content by week. There are additional tabs for grades, notes, discussion forums, messages, and information about the course. The right side column shows estimated end date for the course along with upcoming assignments or quizzes and a button to set a weekly goal. Many of these features may be appealing to end users.

User Profile

Details About You

Introduce yourself to the Coursera community. Connect with learners like you to grow your network.

Work Experience and Education

Tell us about your experience and education to get a personalized learning experience with course recommendations.

Employment Status	Select your current status ⌄
Industry	If employed, tell us what industry you work in ⌄
Employer	If employed, tell us where you work ⌄
Occupation	Student ⌄
Experience Level	Intern / Trainee ⌄
Is it your current employer?	☐
Highest Degree	Select your highest level of education ⌄
University	Ex: New York University ⌄

The user profile page on coursera has unique benefits when used. The user can enter information such as work experience, education, and career goals to allow the service to find courses that may fit the user's needs. Additionally, the user can connect with others who may be learning similar topics by filling out the information on the user page.
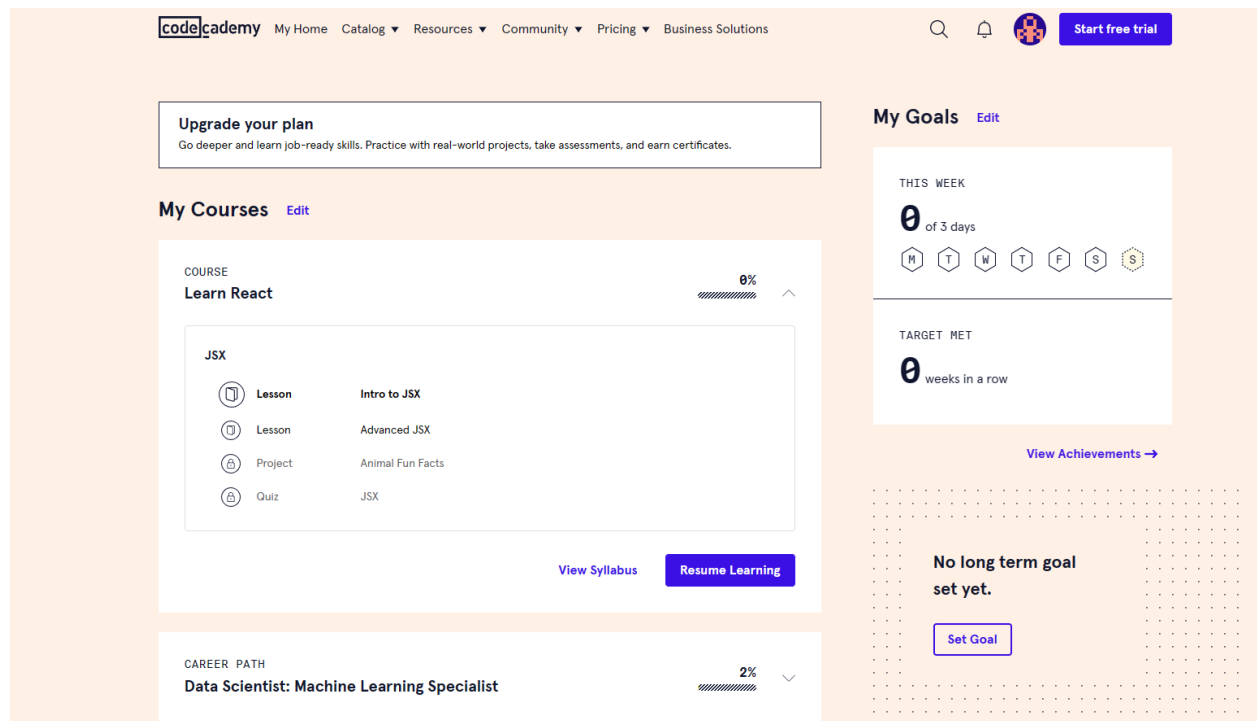
Competitor 3: Codecademy

https://www.codecademy.com/

"Come help us build the education the world deserves."

Target Audience
- **Primarily students and individuals**
- **Individuals with little to no coding experience**
- **Small teams**

User Home Page

The user home page has a clean UI with the user's courses listed along with some upcoming topics. Below the courses is the selected career path along with a progress bar showing how far into the path the user has progressed. The right side displays goals for the week along with how many of them were met. Below is a button to set a goal that will display in the My Goals section.

Course View
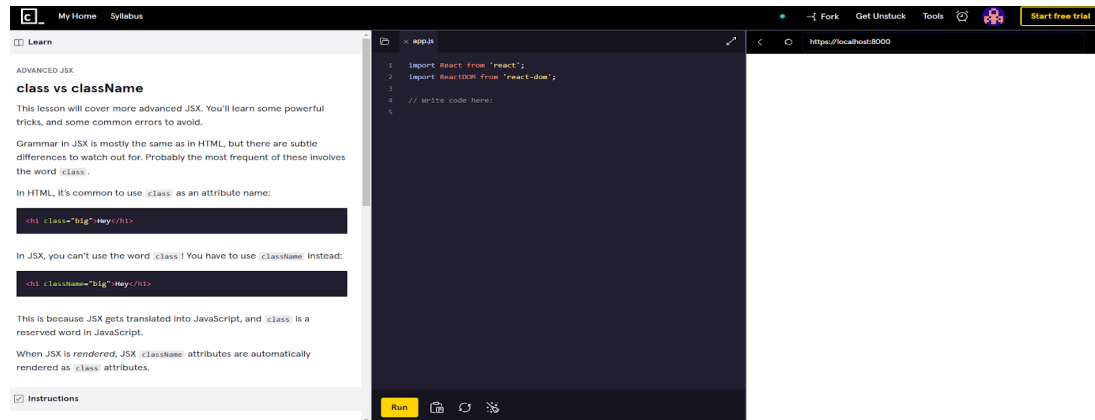
The course view is divided into 3 columns. The left side provides the course instruction, the middle section provides a coding environment to test out what the course is instructing, and the right side provides output for the code that is entered. This feature allows the user to immediately compare their code to that of the instruction material.

Code Docs

Topics ⌃

C

C#

| C++

Cloud Computing

Command Line

CSS

Cybersecurity

Docs Community

Emojicode

General

Git

Go

HTML

Java

JavaScript

Kotlin

Markdown

Open Source

PHP

Docs / **C++**

C++

C++ is a very powerful programming language for performance-critical applications that rely on speed and efficient memory management. It's used in a wide range of industries including software and game development, robotics, microcontrollers, VR/AR, and scientific computing.

The C++ language was created by Bjarne Stroustrup at Bell Laboratories in 1979. As the name implies, C++ was derived from the C language; Bjarne's goal was to add object-oriented programming into C, a language well-respected for its portability and low-level functionality.

C++ Concepts

Arrays	Bitwise Operators	Classes	Comments
Conditionals	Constructors	Data Types	Encapsulation
Enums	Errors	Exceptions	Files
Functions	Inheritance	Loops	Macros
Maps	Math Functions	Methods	Objects
Operators	Pointers	Polymorphism	Queues
Random	References	Sets	Smart Pointers
Stacks	Strings	Structures	Switch
Templates	User Input	Variables	Vectors

Codecademy has a unique feature called Docs, which serves as a coding resource for many different languages and topics. These docs explain different elements of a language such as c++ classes and provide examples of code using them. Docs has an immense amount of information for multiple different languages such as java, C#, SQL,

and more. This feature not only can be used by those learning a new coding language, but can be used as a reference guide by anyone.

Analysis Findings

Pluralsight
- **The sheer volume of content on the site can be overwhelming and thus makes it harder to search for topics**
- **The organizational strategy of putting content into Paths provides an easy to understand direction of instruction for end users**
- **The statistics on the profile page provide insight into a user's learning which may be valuable to implement**
- **Inside of a course, the navigation tools are cleanly laid out and allow switching between topics with a simple click**
- **The course rating feature provides great value for the end user as they can determine which courses are best**

Coursera
- **The style of coursera is more hands-off rather than guided which may differ from the customer's need in an LMS**
- **Due to courses being submitted by multiple organizations, some courses may have overlapping content making it harder to determine which course is best, curated courses may be more desired for the LMS**
- **Organizing content by week provides the user with a sense of pace for progressing through the course**
- **The goal feature allows setting a time allotment goal, a better implementation may include more options such as utilizing a new concept in a program**

Codecademy
- **The home page UI provides essential information only: the weekly goals, current course, and current career path**
- **The code environment alongside the course instruction with code examples would be appealing to users if implemented**
- **The code docs page is an incredibly valuable resource that could be implemented**
- **Having badges for learning goals can provide the user with motivation to continue learning**

Feature	Pluralsight	Coursera	Codecademy
Code Docs	No	No	Yes, multiple topics/languages
Topic Search	Yes	Yes	Yes
Learning Paths	Yes, hundreds	Yes, 24 career paths	12 career paths
Goals	Yes	Yes	Yes
Teams	Yes	Yes	Yes
User Profile	Yes	Yes	Yes
Embedded Coding Environment	Yes	No	Yes
Curated Content	Courses created with specific content for each learning path	Courses submitted by partnered organization, duplicate content	All content is curated
Course Ratings	Yes	Yes	No
Calendar and integration	Yes, google calendar and outlook calendar	No	No

References

Website used to make Personas: https://lucidspark.com/

Website used to make use cases: https://lucidspark.com/

Websites used for Competitive analysis

Codecademy: https://www.codecademy.com/

Coursera: https://www.coursera.org/

Pluralsight: https://www.pluralsight.com/