Paper Title: A project-based student learning approach for secondary programming language learning

Abstract:

Computer programming has come a long way in the past couple of decades. It can be found nearly in every aspect of our life, and utilized, if not useful in every career path a student could choose. Yet, the first step into this life, is to learn how to program. Learning programming was once upon a time, was one of the most challenging concepts when computers first started gaining popularity, but now, there are an abundance of beginner friendly high-level programming languages such as python. Generally speaking, learning your first programming language as python might be great to understand the basic concepts of object orientation a

One of the first major challenge a student in an IT program faces, is learning of a programming language. Yet, they are generally given Python – a beginner friendly language – and then taught Java – a more robust and tricky language. The issue with this, is that the student is required to learn ground up in both languages, which reduces the motivation of learning a second language, as well as the unrealistic approach of learning a secondary programming language in the real world. While project-based learning is relatively much closer to how one would learn in the real world to teach one the necessary high-level skills as required. Therefore, the approach proposed in this paper, will address the students who have had at least one fundamental programming course, to jump into a project-based higher-level course. In this paper, a possible approach to learning is presented by showing a step by step guide to learn the fundamental of android programming in Kotlin, to creating a functional android application.

Introduction:

Kotlin, is a Java programming language that was created to be a “better language” than Java itself, yet still be fully interoperable with Java code.

Before we start with the learning guide, we first need to have a few tools and environments set up. From Oracle, download Java SE Development Kit, and follow through the installation wizard with the default settings. Next, install the latest Android Studio, and when you run Android Studio the first time, it may ask for SDK location. Ignore this and close out of this window. From the Android Studio menu bar, go to Tools, SDK Manager. On SDK Manager, select edit and then make sure Android SDK is selected and click next to install. With these, you should be able to create a New Project, and run it either on a virtual android on Android Studio, or on your physical Android device(recommended).

Related Work:

Methodology:

First step for a student with no background in Kotlin, or android development to do, is to think of what kind of app would they like to create. In this case, we will try and create an app that will help the user create a virtual shopping cart when they physically go shopping, and then store the final receipt. This will enable a user to retrieve a receipt via each item. Potentially, the user can search for the exact receipt for any item them bought, which would resolve receipts lost, and knowing how to return an item.

Subsection: Flow

Since we do not have any background in android development, the first task for the student to do, is to breakdown this giant project, to small individual tasks. This breakdown will help a student develop their critical thinking as well as project management skills. For this project, the breakdown that seemed necessary were:

1. Review basic syntax in Kotlin
2. Task 1: Create a simple app utilizing textboxes to gather user input, store it, and then display it.
3. Task 2: Create a simple app utilizing SQLite as means to store persistent data. (data that does not get wiped when app restarts)
4. Task 3: Create a simple app to utilize cellular camera to scan and retrieve barcode data. This will enable scanning of products to potentially add into a virtual shopping cart.
5. Task 4: Create an app with multiple activity page. This allows the student to start designing the User Interface (UI) in more than a one screen app.

Each of the Tasks are learnt on a need to know basis and starting with a relatively easy step to promote a healthy approach to learning as well as boost student moral in moving to the next step. The vital challenge that will be faced by any student will be in Task 3, to create a persistent database for products, a student would be required to understand some foundations of SQL structures. This will also be learnt via a need to know basis rather than attempting to have the student understand the entirety, we will have the student understand what a primary key, foreign key is, and how to create tables, add data into tables and how to search a database.

\*\*\* Actual guided breakdown of what is to be learnt from each steps 1-5.

Results:

Conclusion:

Since this project was broken down by myself, and not by a relatively new student, we would need to test out this approach with a few students and see how their learning progress is. As the project will be decided mostly by the student, and the instructor will assist in guiding the student in making sure the scope of the project is manageable, the student will be responsible for milestone checks.

Considering the number of project-based approach to learning that has been increasing over the years in IT pedagogy, it is believable that creating something more concrete would help foster the ever increasing number of students in IT, if their goal is development rather than management.