Social Learning-focused Instruction

Community of Practice: 100 Days of Flutter Programming

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Introduction

Flutter is a tool developed by Google that "lets developers build beautiful apps for different devices – phones, computers, and websites – all using a single set of code" (Gemini AI, 2024a). Developers no longer have to write in three different languages for three different platforms: iPhone (Swift), Android (Kotlin), and Web (Javascript). Someone with programming experience can learn Flutter using the online reference documentation *docs.flutter.dev*, take a course on Udemy, or watch videos on YouTube. This paper proposes to use Generative AI prompts, a newly created website "100 Days of Flutter" that captures the output of Generative AI prompts, and a Slack channel to develop a community of practice to help learners gain knowledge of Flutter in 100 days.

Learning Outcomes

This course is designed to be virtual and asynchronous and resembles Massive Open Online Courses. To increase the chance of completion, we will implement automatic grading instead of peer grading. A study by Katy Jordan, "Massive Open Online Course Completion Rates Revisited: Assessment, Length and Attrition" (Jordan, 2015, 40) shows auto grading completion rates between 10 to 25 percent compared with less than eight percent completion rate for peer grading only courses. Since this course is open for anyone to try, we expect completion rates to be in the 15 percent range. To increase the completion rate, we can have a pre-assessment questionnaire

check for previous programming experience, time commitment, and even a small sign-up fee that will be refunded at the completion.

After the 100 Days of Flutter, the learner will:

a) Gain the knowledge to build and publish medium complexity mobile apps to Apple's App Store, Google's Play Store, and a fully functional website.

b) Become a mentor to other learners starting the "100 Days of Flutter" course.

c) Learn, through deliberate practice, how to leverage Gemini AI to be a tutor in their learning process.

Target Audience

These learning modules are targeted to someone who has some programming experience with another programming language and no experience with Flutter. The modules do require the learner to dedicate one to two hours each day to hands-on programming. The learning modules are expected to be used virtually and asynchronously. Even with a name like 100 Days of Flutter, the learner does not have to be working on the modules continuously for 100 days.

Legitimate Peripheral Participation and Community of Practice

In Jean Lave and Etienne Wenger's book *Situated Learning - Legitimate Peripheral Participation*, they write: "learners inevitably participate in communities of practitioners and that the mastery of knowledge and skills require newcomers to move toward full participation in the sociocultural practices of a community… It concerns the

process by which newcomers become part of a community of practice" (Lave & Wenger, 1991, 29)

A community of practice "supports people to learn new activities, knowledge, and skills without engagement in formal education or training processes." (Fuller et al., 2021). Fig 2 illustrates how we can implement the community of practice principles.

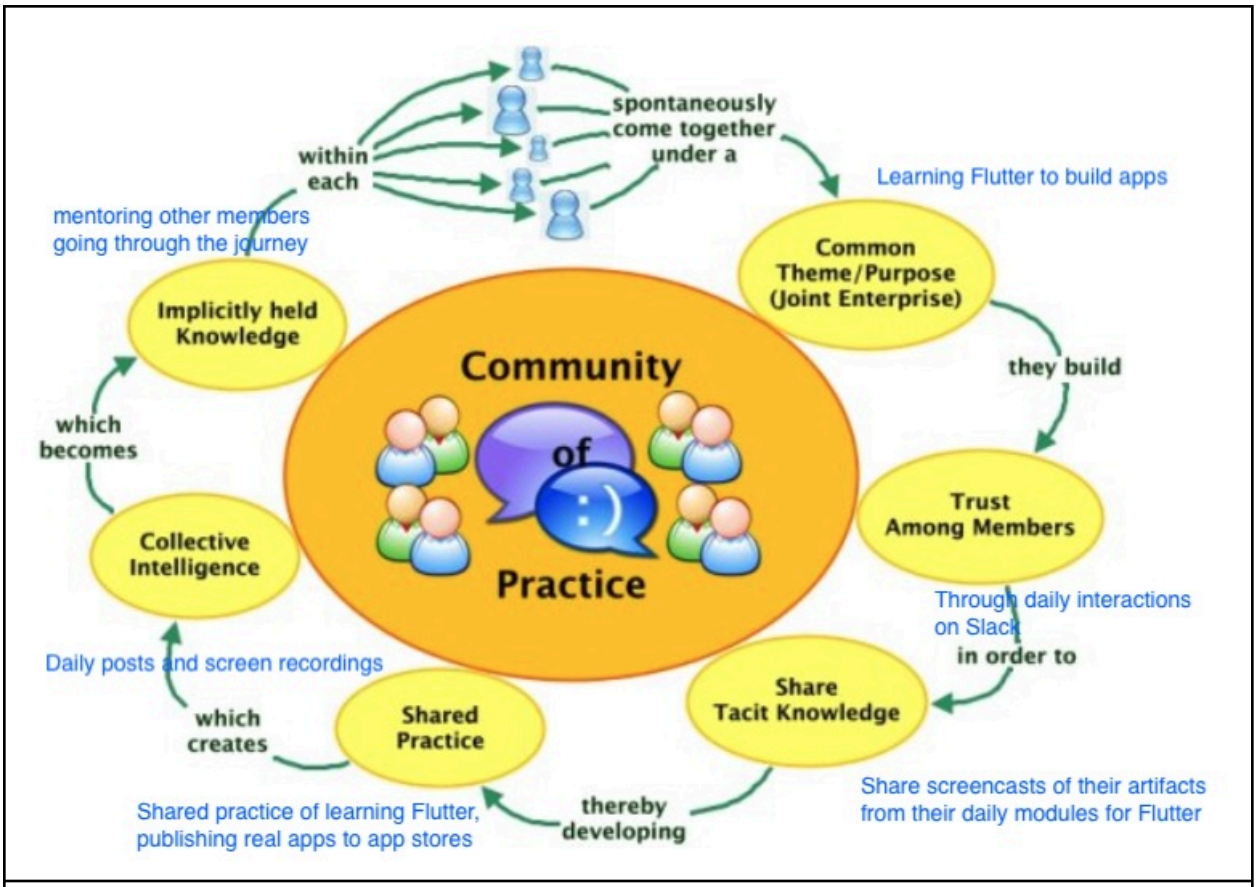


Fig 2: Communities of Practice (Wenger, 1999, #)

To support the 100 Days of Flutter learning modules, we will enable a community of practice using the Slack chatting app. All learners will start with the Day 1 module on the *100days.impactfulengineer.org* website, and be invited to join the Slack channel. The 100 days of content is divided into five sections, Foundational Knowledge, Building

Core Skills, Intermediate Skills, Advance Topics, and Refinement and Exploration as seen in Fig 1. Since learners will not be starting the content on the same day, the cohorts are divided based on which section of content they are working on. We will use Slack and email for weekly communication with each cohort. For example, if student A is working on the content from Day 31, they will be in the 'Intermedia Skills' cohort along with students working on content from Day 31 to 50.

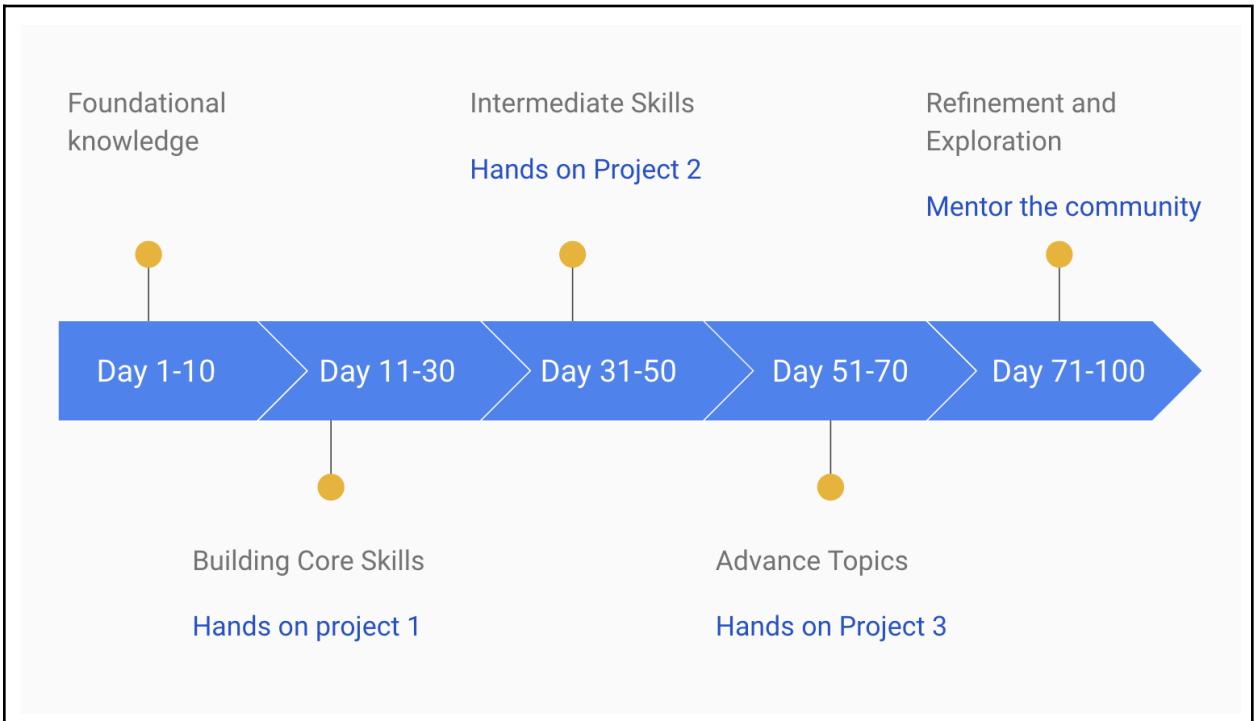


Fig 1: Cohort in the community of practice.

To build a vibrant and sustainable community of practice around 100 Days of Flutter, we will bootstrap the community with at least one expert who has completed the content with three hands-on projects. That first expert can be a paid staff member or the author of this learning module. The goal of the first expert is to help new members of the community finish the first 70 days of content, and then the new members are

encouraged to mentor others as part of the "refinement and exploration" section. Helping others involves answering questions in `#ask-for-help` Slack channels or recording screenshares of the published apps on iPhone, Android, and websites to inspire new learners.

The channel *#100days-flutter-intros* will be used for learners to introduce themselves to the community. Where they are from, what they hope to get out of the class. There will be 100 channels, one for each day. For example *#day1-flutter-show-n-tell*. Each of the day-based channels is for the learner to show the code or screen recording of what they have done or to ask for help with the content for that day. The channel *#ask-for-help* is for people seeking help that is not specific to the day's content. The experts and anyone who is completing their final section "refinement and exploration"

As a learner gets to the later days, for example, *#day88-flutter-show-n-tell*, there is an expectation in the community that the learner should be able to help others who are still working on the earlier day 1 to day 87.

Fig 6 shows how the Slack channels can be structured.

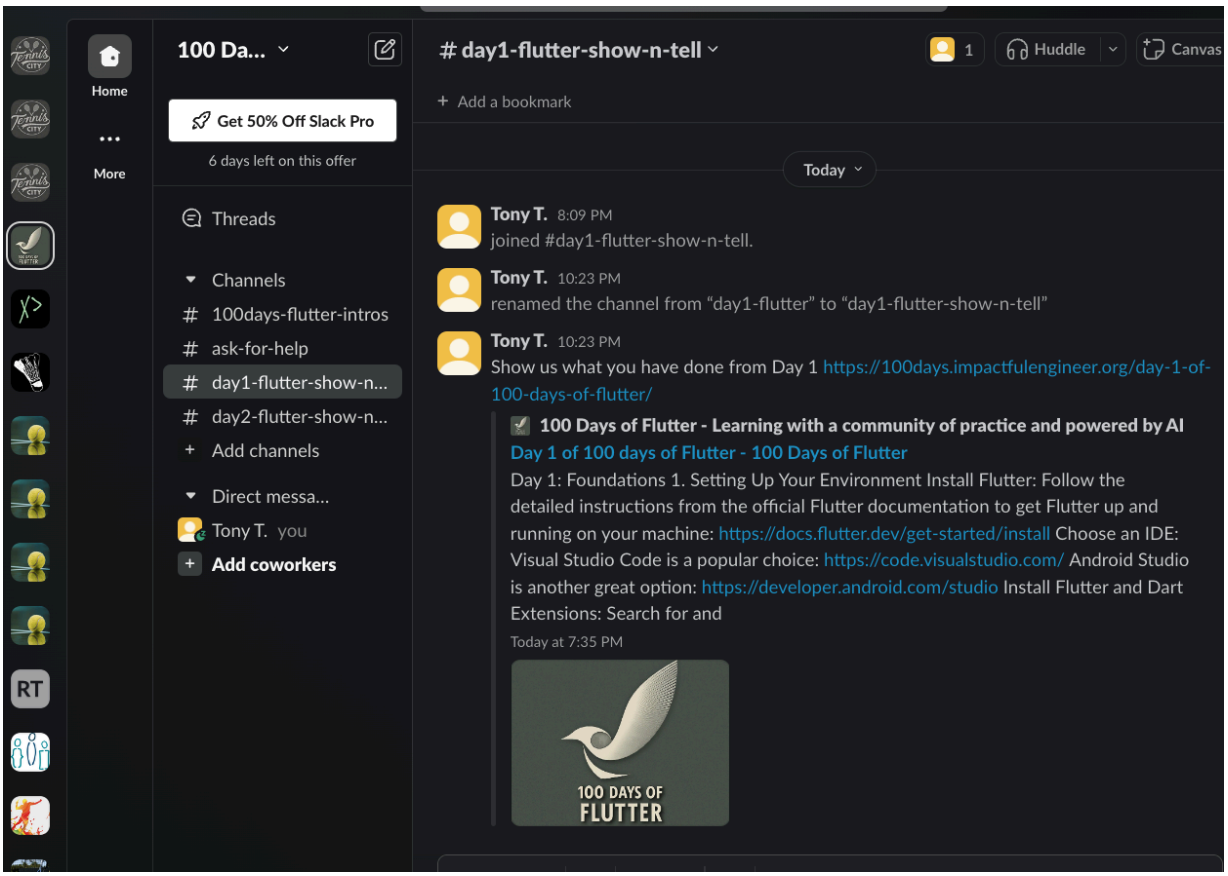


Fig 6: Slack channels to support Communities of practice.

I have asked Gemini AI to help me implement CoP with Slack and it suggests the following, which are really good ideas I have included the suggestions below. (Gemini AI Advance, 2024d)

Shared Domain of Interest:

Project Ideas Channel: Dedicate a channel (#project-ideas) where students brainstorm, propose, and get feedback on project ideas related to Flutter.

Community Building:

Weekly "Show and Tell": Encourage students to share screenshots or short demos of their work, leading to supportive comments and skill-sharing.

"Study Buddies" channel: A place for students to connect and arrange virtual pair programming or co-working sessions.

Practitioner Focus:

Troubleshooting Threads: Have students post specific coding problems as threads within the #help channel, allowing focused collaboration on solutions.

Code Review: Designate a channel where students can request feedback on code snippets before project submission.

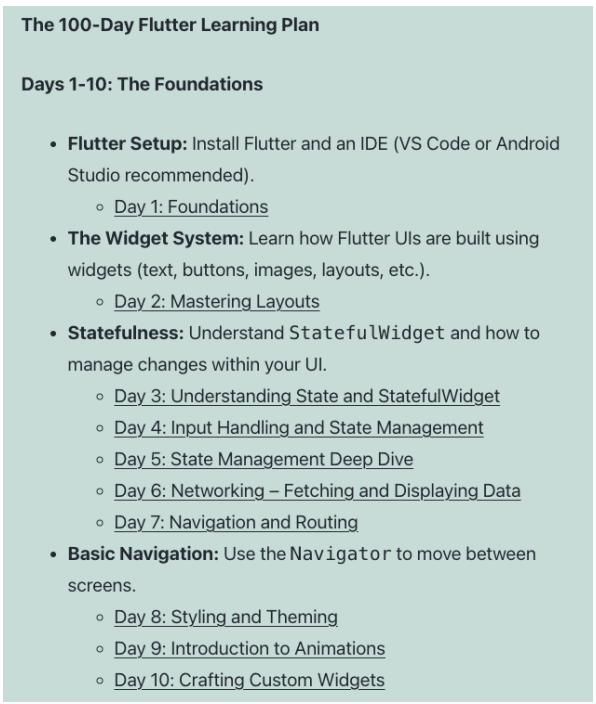
Mentorship:

Mentor Office Hours: Set up time slots where mentors are available for live help sessions or Q&A within Slack.

Ask Me Anything (AMA): Invite guest speakers or experienced professionals for AMA sessions with the community.

Using Generative AI For Content

We propose to use Gemini AI from Google, starting with this prompt "*Act as a tutor and teach me how to code in flutter over 100 days, with 3 hands-on projects that increase in complexity over time.*" (Gemini AI, 2024b). In Fig 3, we show the output of the plan for the first ten days. In Fig 4, Gemini AI proposed a concrete hands-on project to track income and expenses. We will copy the output of Generative AI verbatim and ask the learners to make use of their own Generative AI tool of choice to help them along their learning journey. The learners can use Slack to ask questions in a *#ask-for-help* channel, or a channel specific to that day's content.

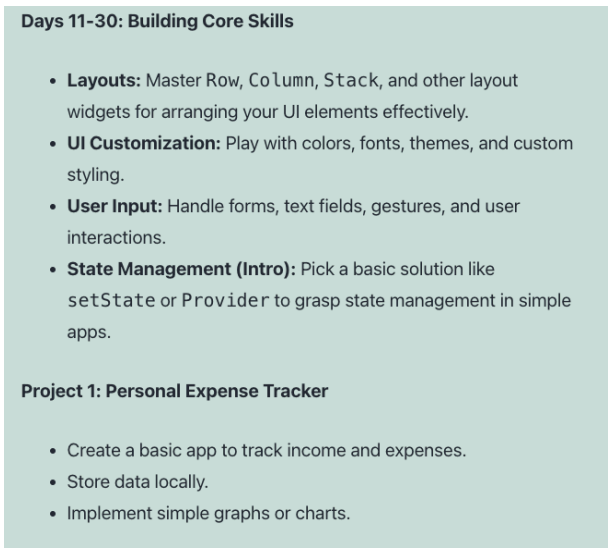


The 100-Day Flutter Learning Plan

Days 1-10: The Foundations

- **Flutter Setup:** Install Flutter and an IDE (VS Code or Android Studio recommended).
  - Day 1: Foundations
- **The Widget System:** Learn how Flutter UIs are built using widgets (text, buttons, images, layouts, etc.).
  - Day 2: Mastering Layouts
- **Statefulness:** Understand `StatefulWidget` and how to manage changes within your UI.
  - Day 3: Understanding State and StatefulWidget
  - Day 4: Input Handling and State Management
  - Day 5: State Management Deep Dive
  - Day 6: Networking – Fetching and Displaying Data
  - Day 7: Navigation and Routing
- **Basic Navigation:** Use the `Navigator` to move between screens.
  - Day 8: Styling and Theming
  - Day 9: Introduction to Animations
  - Day 10: Crafting Custom Widgets

Fig 3: First 10 days of content generated by Gemini AI



Days 11-30: Building Core Skills

- **Layouts:** Master `Row`, `Column`, `Stack`, and other layout widgets for arranging your UI elements effectively.
- **UI Customization:** Play with colors, fonts, themes, and custom styling.
- **User Input:** Handle forms, text fields, gestures, and user interactions.
- **State Management (Intro):** Pick a basic solution like `setState` or `Provider` to grasp state management in simple apps.

Project 1: Personal Expense Tracker

- Create a basic app to track income and expenses.
- Store data locally.
- Implement simple graphs or charts.

Fig 4: First hands on project before Day 30, generated by Gemini AI

Website to host Generative AI Output

Since AI output will be different each time it is asked the same prompt, we will capture the output into a WordPress website (100days.impactfulengineer.org) so that the content won't fluctuate. We follow the initial prompt with another 100 prompts of the form "Let's start on day N of the 100-day flutter" where N is 1 to 100 and capture that output into 100 pages on the Wordpress website. A sample output is captured in Fig 5. (Gemini AI Advance, 2024c)

The output of generative AI captured in 100 modules must be verified by an expert who will first try to follow the instructions and record down the amount of time and effort needed to complete the module. Each module should be doable in less than

2 hours. The expectation is the learner would also use Generative AI to help them complete the module. The world is moving towards a place where Generative AI is a co-pilot for software engineers, so we should mimic this reality while learning Flutter.

Fig. 5 Details of what Day 1 looks like, generated by Gemini AI captured on a WordPress webpage

Conclusion

By using Generative AI to create content for 100 days of learning Flutter, capturing the output with the website 100days.impactfulengineer.org, and creating a community of practice using Slack, we believe the persistent learners will gain the skills and knowledge to create Flutter applications after 100 days. By using Generative AI as prompts to create the content, and asking learners to use Generative AI to guide themselves through the content, the learners will also gain comfort and skills in using GenAI as a tutor.

References

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