

BUILDING A MOBILE APPLICATION FOR TEACHER COACHING



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Overview

Demand for coaching as part of support to teachers' continuous professional development (CPD) is growing and substantial appetite exists for digital coaching applications (apps) that can provide accessible resources. However, the absence of comprehensive toolsets that can be used in a variety of contexts makes it difficult to implement digital coaching tools to help guide the coaching process and data collection. Many existing tools are proprietary and may risk departing from core missions where the ability to address specific needs and meet data security and privacy requirements varies. While demand for digital coaching tools is high, few global public goods are available to provide solutions beyond data collection. This guide provides an outline or roadmap for building coaching apps,¹ using examples from the World Bank Group's *Coach* program as a model.

The *Coach* program is a World Bank global initiative focused on helping countries improve their teacher CPD programs and systems (in-service). The *Coach* program encompasses support to countries to improve different forms of CPD, including, for example, training through workshops, seminars, online courses, and school- and cluster-based training, and support through collaborative learning communities, mentoring, coaching, and more. The program features open-access global public goods in the form of tools and resources for policymakers, researchers, system-level leaders, pedagogical leaders, and teachers, providing guidance on how to design, implement, and evaluate CPD programs and systems. This note relates to the *Coach* program tools and resources focused on models of mentoring and coaching that support teachers in applying and practicing new knowledge and skills, in particular, foundational teaching skills (FTS).

These specific tools and resources are designed to be customized for a variety of contexts—thus no two mentoring and coaching implementations are expected to be the same and could involve any combination of data collection modalities (for example, paper-based, fully digital, or a hybrid of both approaches). Substantial data are created throughout the coaching cycle. By strategically integrating digital technologies in the process, these data can be made easily accessible to teachers and their coaches, making coaching sessions and their preparation and follow-up more efficient.

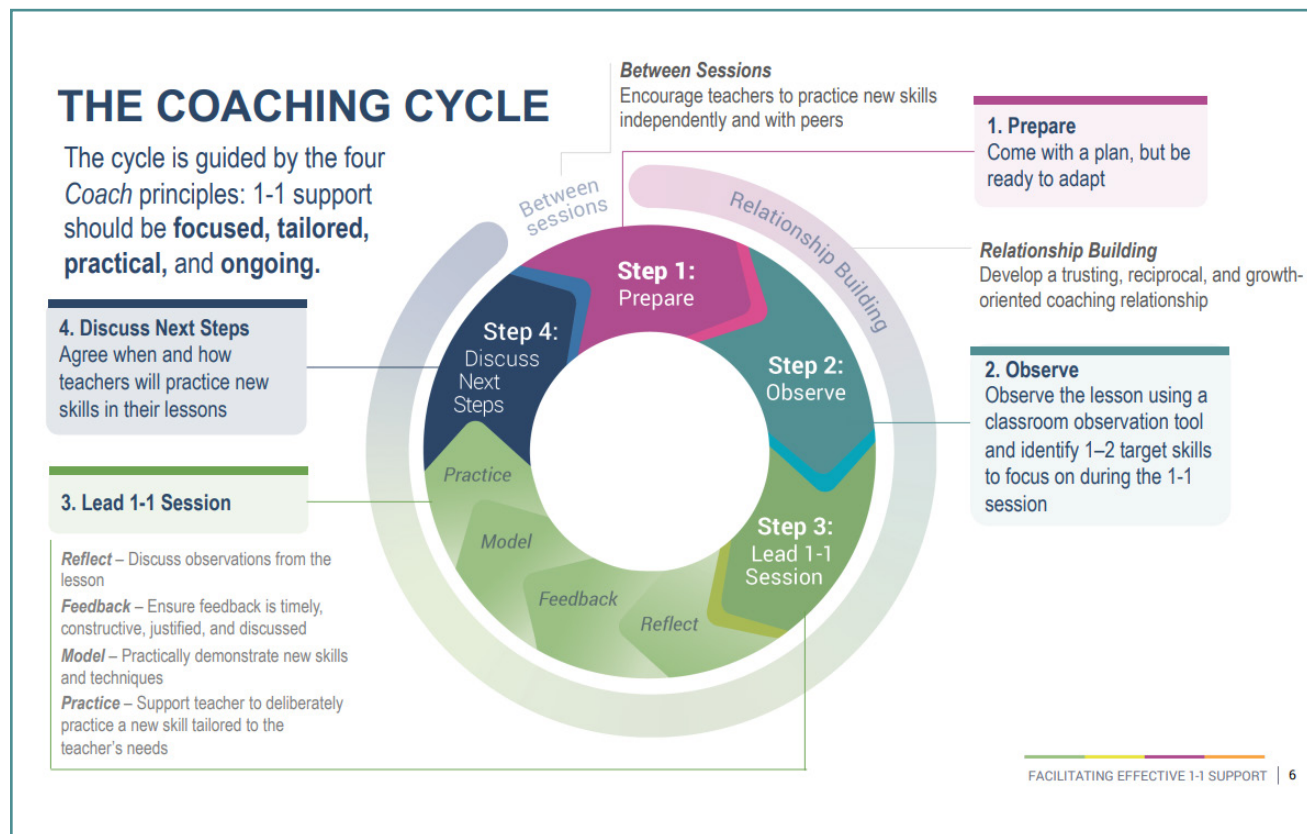
By accompanying the coach along the entire process, a mobile coaching app may provide increased efficiency and personalized experiences, while achieving data collection and measurement objectives to increase coaching quality and, ultimately, improve teacher practices and student outcomes. Efficiency gains are primarily achieved through prompted guidance of the coaching process, electronic data collection, and reporting. Apps that follow the coaching protocols provided in the *Coach* program tools and resources or similar may also be used as guides, facilitating tailored experiences for coaches as they guide teachers through the coaching cycle (Figure 1). Specifically, such apps guide the coaching process through all steps of the coaching cycle:

¹ Throughout this document, the term “coaching” is used generically to encompass the World Bank Group's *Coach* program as well as similar models for CPD.

- **Prepare:** Discuss the lesson plan, objectives, and any areas where the teacher and coach would like to focus the classroom observation. *A digital coaching app can provide a list of prescribed lesson plans and objectives, together with resources for the teacher, if desired.*
- **Observe:** The coach attends the lesson, makes notes, and rates the teacher on teaching practices, student engagement, use of materials, and any other predefined focus areas. *A digital coaching app can capture notes and ratings.*
- **Lead 1-1 feedback session:** The coach's feedback is shared with the teacher, including commendations for strengths and areas that might need improvement. *A digital coaching app can be used to share data recorded with the teacher and provide resources for improvements.*
- **Discuss next steps:** Notes, feedback, and progress toward goals are documented for ongoing development and reflection. *A digital coaching app can facilitate ongoing collaboration, with the ability to share resources, progress updates, and communication in real time.*

The coaching process is designed to be iterative to provide a focused, tailored, practical, and ongoing professional development cycle for teachers. As teachers cycle through the coaching process, data can be provided in real time to pedagogical leaders to monitor skills progress at the school, district, and/or national level.

Figure 1. Sample coaching cycle



In adapting paper-based coaching materials² to digital format, online apps provide several opportunities and challenges:

OPPORTUNITIES

- 1 Faster data collection**, as data may be reported to a central repository directly when the app user is online
- 2 Reduced data entry error**, as coding of paper sheets is eliminated
- 3 A richer experience for pedagogical leaders using the tool**, as a well-designed app can provide other media (e.g., linked guides or videos)
- 4 Immediate, actionable insights** due to real-time data analysis and dashboard capabilities
- 5 Integration with other systems used by clients**, enabling dynamic use of data produced to support a variety of programs and initiatives

CHALLENGES

- **Time- and labor-intensive** nature of digital products
- **Customization** of proprietary products to meet local needs, data ownership, and use
- **Ongoing support and maintenance of apps** and other digital products to ensure continuing operation, security, and compatibility with evolving operating systems and networks
- **Difficulty in adapting apps** if/when usage mission changes

This guidance note contains step-by-step instructions to build a digital coaching app to support teachers in applying and practicing new knowledge and skills as part of a preexisting coaching model. Annex 2 tells how to select a platform. This effort will help pedagogical leaders and principals improve their support to teachers by easily tracking data associated with conducting classroom observation visits, thereby better identifying skills teachers need support with and providing high-quality feedback. The data collected as part of app-based coaching intervention will help teachers, coaches, school leaders, and others determine where they should place their efforts and resources. This note assumes that a coaching model has been designed and is already integrated in a preexisting system. The note does not provide guidance on how to design a coaching protocol for implementation in any context. Instead, policymakers and practitioners may use this guide as a roadmap for adapting their existing coaching programs for digital data collection, coaching, and monitoring. To complement the adaptation process, this guidance note includes a sample Terms of Reference for hiring developers and other materials that can be used to replicate the use of the app, either in part or full, appropriate to the intended context of implementation.

² The *Coach* program provides sample paper-based coaching materials that may be digitized. For instance, the [Foundational Skills Teaching Guide](#) outlines a set of 11 Foundational Teaching Skills (FTS). For each skill, the guide provides a clear description of what it entails, step-by-step guidance on how to implement it effectively in the classroom, and a detailed example.

Development Steps for Building a Digital Coaching Application

Pre-implementation



Select project leaders

Before a general architecture, and app requirements, may be elaborated, a development team should be selected. Its members may be hired through a firm or as individuals and the project leaders' roles should be based on the following profiles:

- A **product owner** develops a clear vision of what the product should look like and how it should function. The product owner should be knowledgeable of the coaching system to be digitized, the institutions sponsoring the product, the client's particular needs, and expectations from end users. The product owner works closely with the rest of the development team, helps make key decisions on features and priorities, and provides feedback to the development team for improvements before their work is accepted.
- A **sprint manager**³ (or **scrum master**) serves as a software development generalist to lead implementation of the software development plan through a project management process (that is, Scrum or Agile development) and to provide quality assurance (QA).
- When a product owner does not have expertise on the coaching model, a **coaching/pedagogical specialist** may be added to the project development team. The specialist is responsible for working with the product owner to ensure that product needs are translated into features and priorities for the app. The specialist also provides input during product review to ensure the app meets its functional requirements.

Key to the product owner's (and coaching/pedagogical specialist's) role is "translation" of the client's coaching protocol into a technical plan. The sprint manager provides support in furthering development of the plan into specific technical tasks aligned to a completion timeline, identifying areas to bring in specialist developers to complete the project.

Both the product owner and sprint manager may be able to identify team members to work on specialized roles, tasks, and estimated time and resources needed to complete the project. If individuals or firms are not readily engageable, social tools such as LinkedIn could be useful in building a development team, keeping in mind that team members should ideally have international development experience in addition to technical skills.

Project timelines for a software development project are typically created by breaking down the project into smaller tasks and milestones, and then estimating the time required for each task. This process involves input from various stakeholders, including developers and clients, to ensure that the timeline is realistic and accounts for dependencies, resource availability, and potential risks.

3 In small projects, a sprint manager can also serve as a product owner.

First: Frame app for the local context and requirements

A coaching app prescribes an algorithmic approach to provide feedback to teachers. Countries and clients, however, may require a modified flow and instrument to meet their various needs. For example, a country may (1) decide a simplified tool is necessary, (2) wish to measure FTS (that is, teaching practices or behavioral markers) that meet its policies and initiatives, or (3) need the data collected by the instrument to conform with currently deployed data systems.

To start the conversation with the government, the project leader,⁴ in coordination with the product owner, can ask foundational questions about the current program and the government's aims for the app:

- What is the current coaching model? Who is the coach (for example, senior teachers, principals, district officers, or external specialists)? What tools are used? What part of the coaching cycle is easiest? Hardest? Are data available, and at what level? How are data used? How would you like data to be available?
- Apart from providing a coaching experience, what specific functionalities does the government have in mind for the app?
- How will the coaching tool align with and support existing policies and initiatives to improve coaches' technical skills and teaching quality in the country?
- Who will host the app and are there any constraints on how it should be deployed? Do any regulatory, data privacy, and security concerns need to be addressed during the development process?
- How will the client measure the impact and sustainability of the coaching software over time?

When framing a digital coaching deployment for clients, working with the product owner, a few questions should be asked of policymakers to *identify an appropriate app flow*:

- What skills are a priority for this intervention? What is the set of FTS and how will they be evaluated (for example, through a set of yes/no questions or a rubric)?
- What is the digital literacy level⁵ of field leaders and managers to use the tool and interpret data collected, and who will support the pedagogical leaders and app in the field?
- What is the level of technical expertise expected of pedagogical leaders in the field? Will the app need to be designed to guide them along a full-featured coaching process or provide a streamlined data-entry approach?

A few technical questions are necessary to help *frame the app development*:

- What is the status of the information technology (IT) infrastructure in the target country and do any constraints or considerations need to be addressed? Are there specific challenges, technological or otherwise, at the school level in accessing this infrastructure? ***This helps to***

4 A project leader serves as a communication link between the development team and other stakeholders, including task team leaders, clients, management, and targeted users of the product. The project leader works to develop the project scope, establish development timelines, align resources, and manage expectations for the finished product.

5 While various standards are available to measure literacy, in the case of a coaching app, it is likely sufficient to assess how often coaches and managers use mobile technologies, such as smartphones. In cases of low use, greatly simplified application interfaces may be prescribed.

define how the app will transmit data for recording and analysis and if any technologies need to be integrated to ensure reliable data synchronization, etc.

- Are any modifications needed to measure coaching skills as already laid out in the coaching program's design? To what extent will the selection of skills to be worked on be automated by the app? Are all measurement items required or are some optional? ***These questions help inform the user flow through the app and should be defined as early as possible to avoid complications in the app development cycle.***
- What information will be provided to the coach to support delivery of the coaching session? Which coaching materials should be incorporated into the app? ***This helps to build an understanding of the coaching flow for developers and if, for example, an app also needs to support views for teachers to access coaching materials.***
- What is the timeline for development, testing, and implementation? ***Ideally, a development timeline would provide for several iterations of development and testing before implementation.***
- Who will own and have access to the coaching data and how will the data be used? At what level of detail should data be reported (for example, nationally, regionally, by postal code, etc.)? ***This helps to frame how the administrative dashboard, reports, and data export tools will be built.***
- Will the client provide data center servers to host the database and backend logic of the app or does a hosting solution need to be identified? ***This relates to the previous question and helps to identify a hosting provider/platform to be used for the app.***
- Will the app need to integrate with existing data systems, such as a single sign-on system to manage users, a learning management system, or an educational management information system (EMIS)?⁶ ***Understanding integrations helps align data collected in the app with other systems for reporting and analysis.***
- What levels of access to system data should be provided (for example, to administrators, regional managers, and/or school principals) and how would their use of the system differ?
- Will the app need to operate in fully offline environments or is full Internet connectivity guaranteed?⁷ ***As a best practice, apps should be built for the lowest level of connectivity expected in the deployment environment.***
- What other support needs to be given to the coach to ensure continued engagement in the app and recording of quality data (for example, nudges, gamification, badges, etc.)? ***Mechanisms to encourage engagement help improve the user experience and can be instrumental in increasing data accuracy and continued use of the app for coaching and teacher improvement.***
- Finally—and crucially—who will be responsible for provisioning the hosting and supporting the app (user training and technical support) after development and testing? ***Deployed coaching apps should have a long-term support plan to ensure functionality in the field, continued access to data by managers, and ongoing software/security maintenance.***

6 See especially World Bank Group EdTech Team (2022).

7 If full Internet connectivity is not guaranteed, a coaching app should be built to function offline as well as online, synchronizing data when a connection is available.

STEP
2

Second: Select an application architecture and framework

Defining a software architecture is a critical part of the software development process, as it provides a blueprint that guides the system's design, development, and evolution. For program managers, a well-defined architecture is important because it provides a common understanding of the system among stakeholders, and it helps to ensure that the system is easy to maintain and evolves over time. It is important to note that project managers should ensure that app designs reflect the enabling environment, including Internet connectivity, access to electricity, availability of IT support, digital literacy of users, and political will of the host government to make use of the data.⁸

Once the framing questions delineate the app for the local context, a product owner should delineate the requisites for a minimum viable product—the core features and functions required for the project—and establish the general software architecture to guide the broader development team to meet the project's mission requirements. Key to this is selection of software frameworks that aid in reducing app complexity, reduce the number of software bugs, provide for greater maintenance by others familiar with the frameworks, and enhance app security through peer review of core elements. To maximize code longevity and maintainability, it is recommended to use common frameworks with which future software developers and maintainers may easily familiarize themselves. It is further recommended to evaluate software frameworks for each of these components with an expert who understands the mission requirements for the app before making a final decision.

Backend software frameworks include Django,⁹ Ruby on Rails,¹⁰ ASP.NET Core,¹¹ and Laravel.¹² These are used to run the application logic on the data server and communicate with frontend apps that the pedagogical leaders will use via sets of application programming interfaces (APIs). The application backend is also responsible for interfacing with the database. In other words, a backend handles the business logic and recordkeeping needed to support the app. It is common for a project to use different frameworks to control various aspects of the backend, especially if the app has requirements to connect with other data systems, such as an EMIS. Selection of a backend framework may depend on ensuring code compatibility with legacy systems. To aid in this selection, the product owner should engage in conversations with key stakeholders to help determine which framework would best meet the needs of the project.

The application database could be hosted on the same server as the backend (for example, MySQL or Postgres), provided from a data center (using the same tools or proprietary software for larger-scale database deployments such as Oracle Database or Microsoft SQL Server), or subscribed to from a cloud host (for example, Amazon RDS, Redshift, or Google Cloud SQL). While many alternatives are emerging, it is recommended to build a coaching app using a SQL-compatible database, the most adopted standard among various database solutions. *Coach* logic works well with relational databases, and tables produced may be used easily for dashboards and integration with other data systems. Such compatibility makes it easy for other developers to tap into the database and run queries for specialized reports, data analysis, etc.

8 The [World Bank's EdTech Readiness Index](#) may be a useful tool to identify and measure the different enabling factors that are required to ensure the environment meets the minimum criteria needed to be used effectively.

9 <https://www.djangoproject.com>

10 <https://rubyonrails.org>

11 <https://asp.net>

12 <https://laravel.com>

Frontend frameworks are most likely to be proposed in one of two categories: Web application frameworks and mobile development frameworks. Popular Web application frameworks include Vue.js,¹³ Node.js,¹⁴ and Angular.¹⁵ Mobile application frameworks such as Ionic,¹⁶ Xamarin,¹⁷ and Flutter¹⁸ are used to develop apps that run natively on mobile devices and can be distributed via Android and iOS app stores. In situations where a fully offline app is necessary, developers may opt to use a mobile application framework to build a coaching app but use a Web application framework to provide administrators and managers with a dashboard and reporting tool. This allows for the offline collection of data that may be analyzed online when remote devices periodically connect to the network.

If building a mobile app (for example, for Android or iOS), it is important to note that many countries and operating environments do not have access to the latest hardware and software builds. It is thus advisable to build apps compatible with older software versions to extend the potential reach of the coaching tool deployment.

A technical framework for application hosting must also be determined in coordination with the client. Key to the conversation is whether clients have the computing resources, such as a data center, to host the app backend and database themselves or if a cloud provider or local data center is necessary. Further considerations on selection of an app hosting framework include data ownership and local laws and regulations that guide appropriate use of data collected on the coaching system. For example, local regulations may require that all data collected be stored within the geographical constraints of the country or that data collected be made available for review, modification, or deletion.

Further architectural features to consider:

- If the app is intended to fulfill multiple requirements (for example, tracking teacher attendance in addition to coaching) or could be deployed in various countries, consideration should be made to provide for easy portability of code and reuse on different systems or in different country contexts. For example, a product owner could request that developers include a “microskill builder” to allow future users to edit, add, and reprioritize skills important to their context. Furthermore, coding requirements must clearly state that in-line documentation with the software code is necessary so future development teams can easily navigate and modify the software and build upon previous work.
- If the app is being developed as a public good, it is recommended to use open-source frameworks and tools, which would eliminate the need for any vendor-specific lock-in with software. Adopting an open-source approach allows future teams to make modifications to the core software and deploy to system architectures of their choice.¹⁹
- If integrations with external systems are required, API routes (connection points between the frontend and backend or connections between the backend and other systems) should be defined at the onset to maximize data compatibility between the coaching implementation and the external system. This helps to avoid problems that emerge when systems need to be retrofitted to work with each other.

13 <https://vuejs.org>

14 <https://nodejs.org>

15 <https://angular.io>

16 <https://ionic.io>

17 <https://dotnet.microsoft.com/en-us/apps/xamarin>

18 <https://flutter.dev/>

19 For more information, see especially World Bank (2019).

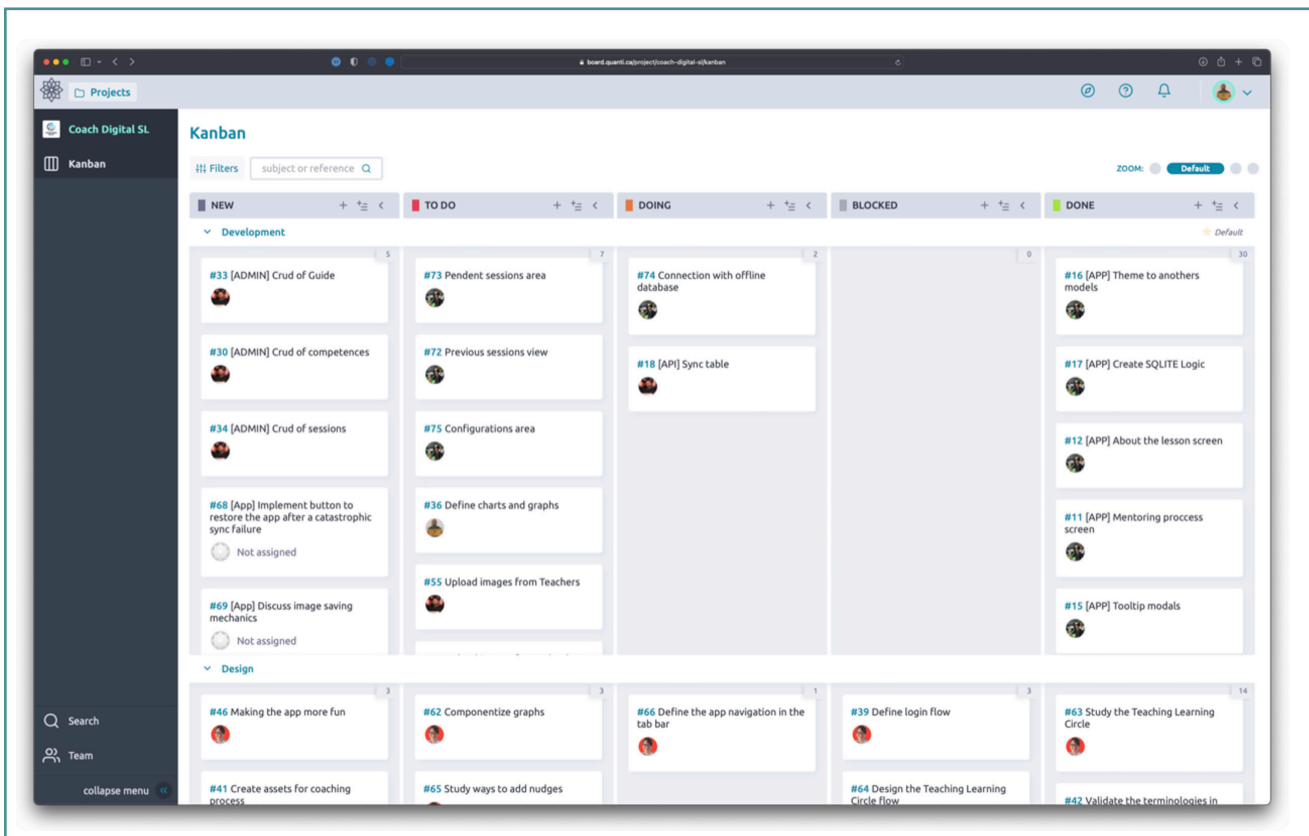
STEP
3

Third: Organize the development cycle

With the general architecture and app requirements determined, a development team should be engaged to begin production. Specialist developers—focused on the user interface/experience (UI/UX), backend development, and frontend app—should be engaged to work with the sprint manager to implement the project plan. Development of a coaching app for a local context will likely not require a large team, but the responsibilities of the team need to be clearly delineated. Annex 3 contains sample development team profiles that can be used in a Terms of Reference document.

Software development is often an iterative process, beginning with design prototypes (wireframes). The sprint manager’s role is particularly crucial in clearly communicating the “story” of the app to each team member, together in meeting deadlines made in agreement with the product owner and clients. At the end of each week, progress made is reviewed and feedback is fed forward into the next week’s plan for improvement. Software development tools that teams typically use to collaborate include Slack²⁰ (team communication) and Jira²¹ or Taiga²² (project management—see Figure 2 for an example dashboard from a project management tool). For small teams, these services are available at no or little cost. Larger teams typically require subscriptions, priced on a per seat basis.

Figure 2. Typical software project management dashboard



20 <https://slack.com>

21 <https://www.atlassian.com/software/jira>

22 <https://www.taiga.io/>

Implementation

STEP

4

Fourth: Pilot, refine, and deploy

The final development step is to test the coaching app, gain and incorporate feedback, and prepare for final deployment. If a Web app has been developed, a domain name should have been issued by the client or purchased through a registrar and pointed to the frontend and administrative dashboard apps. Any software that needs to be installed to servers or cloud should be deployed.

Before formally deploying the app at scale, it should be ***piloted with a group of users***²³ in the local context (that is, with pedagogical leaders and field managers) and ***focus groups should be conducted***. The pilot should focus on the user experience and technical functionality, gaining feedback on what does and does not work.

- What are your previous experiences in using mobile apps to collect data?
- How would you describe your overall experience using this tool?
- How easy was it for you to use the tool?
- What did you like best about using the app?
- What elements do you think are missing?
- Are there aspects of the app you would change?
- Is this app more useful than using a paper-based instrument? Why, and if not, how can it be improved?

If time and resources allow, participants may be provided distinct options for how certain features of the app are presented (A/B testing). After review from the project owner and project leadership team, adjustments may be made to the app in a final development iteration.

Post-implementation

STEP

5

Fifth: Scale and sustain the project

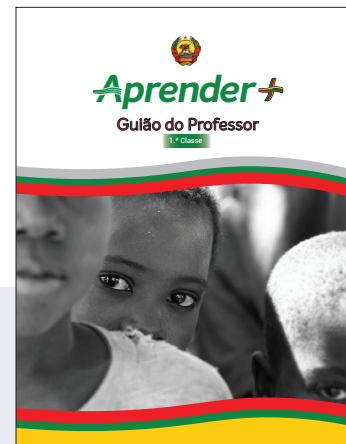
After an initial pilot and QA testing, a plan to support local users should be in place. If the app is hosted and supported independently, a long-term support plan should be implemented to monitor the system, support users, schedule regular data backups, and perform system administration tasks. A handoff of the app and related supporting elements to a client should ensure this plan is developed and adopted to ensure stability and sustainability of the implemented program.

If the software is intended to serve as a public good and published as open-source software, the development team should post an archive of the final source code, together with documentation on how to install and use the app in an open repository, such as GitHub.²⁴ If future development is anticipated, the support team should be included in the development cycle to provide retrospective insights that can help inform future development, particularly around improvements to the user experience.

²³ Ideally a small enough group to encourage open conversation, but large enough to collect meaningful data. Suggested focus group size is 6–10 users.

²⁴ <https://github.com>

Case Study: Mozambique Pilot



A pilot implementation of a coaching protocol was developed for the **Aprender+ program in Mozambique in 2022**. The program was heavily adapted from the global *Coach* materials, focusing on early grade reading and providing a structured pedagogy approach to support teachers in their instruction. As the initial software build was intended for use in a pilot, the project's minimum viable product specifications described a simplified approach, with a customized set of FTS in a fully online environment, delivered through a progressive Web application. The tool was designed for recording low-inference observation data from a structured pedagogical approach in low-capacity settings. The customized coaching flow guided users through selection of a lesson plan for teachers to use while under observation and integrated a series of yes/no questions to determine a teacher's particular strength among various microskill areas. The app also provided pedagogical leaders an opportunity to upload any evidence (e.g., pictures or other files) they found useful.

The pilot was designed to run on typical host environments and was tested on both AWS Lightsail and Linode cloud hosts. AWS S3 was used for object storage of images and other files submitted by users to minimize storage pressures on the server and help scale the system better.

Figure 3. Screenshots from the Aprender+ coaching app

The figure displays three screenshots of the Aprender+ coaching app interface. The first screenshot shows the home screen with a user profile for 'Camila', a list of teachers including 'Janderson' and 'Carol', and a bottom navigation bar with 'Início', 'Guião', and 'Perfil' options. The second screenshot, titled 'Novo encontro', shows a 'Prepare o encontro' section with instructions to study the protocol and prepare a demonstration, followed by 'Notas de preparação' and 'Dicas para preparar-se' which includes bullet points like 'Comece com uma pergunta de acolhimento' and 'Explique ao professor o porquê de ter escolhido essa competência'. A 'Completar feedback' button is at the bottom. The third screenshot, titled 'Sessão', shows a session log for 'Iniciada dia 13/11/2023' by 'JS Janderson', with a vertical progress indicator and steps: 'Observação de toda a aula', 'Preparação do encontro de acompanhamento', 'Encontro com o professor', and 'Documentação'. A 'Documentar' button is at the bottom.

These screenshots of the Aprender+ coaching app illustrate the selection of teacher profiles by a coach and a guided walkthrough of a multiple-step teacher coaching process.

The development team comprised a small group of World Bank consultants who worked on the project over approximately six months. Effort was made to make the tool and underlying code expandable and adaptable for reuse in future projects. The backend architecture was designed to provide flexible project management (including capabilities to host multiple projects on one server), microskill definitions, localization, and reporting. Backend APIs were developed to easily support integration with a frontend app for pedagogical leaders to use the coaching process in addition for providing for future integration with external systems operated by the client. An administration dashboard provided project management options and basic reporting visuals to help track teacher progress and use of the system across schools.

Initial testing with a focus group comprising teacher pedagogical leaders in Mozambique revealed several lessons that may be generally relevant for future *Coach* development teams:

- Despite the assumption that Internet connectivity would be available for users in the pilot, reliable, fast connectivity was elusive. Future development should consider prioritizing app functionality for offline use.
- Attention needs to be placed on simplifying user interfaces to the greatest degree possible to eliminate confusion for users. Literacy on navigating *Coach*-like apps should not be assumed and app designs should be designed for simplicity and clarity—users should understand where they are under each step of the coaching cycle, what has already been done, and what steps need to be taken next. Complex screens and any interactions that require moving back and forth within the app should be avoided and users should be able to review data they previously entered.

The source code for the Mozambique pilot is published as a global public good, available for reuse under an open-source license. Project source code is available at <https://github.com/WBG-Coach> and installation instructions are provided with each software component (backend, frontend, and administration tool).

Resources

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Annex 1: Frequently Asked Questions

What are the key features of a coaching app, and which features should be prioritized for users with limited access to technology and resources?

A coaching protocol typically consists of four phases: observation of teacher in classroom; selection of a skill (or skills) for coaching; coaching, based on the skill, for guidance during a coaching session; and documentation of the coaching session for follow-up. For an app in a low-resource environment, features that can work offline or with limited connectivity (for example, using QR codes to provision and preload crucial data specific to the coaching environment) with a simple and intuitive interface should be prioritized.

Is there a “master” coaching app I can use to help build an app for my country or context?

It is important that each coaching app meets the missions of its environment. Although demand for coaching apps is high, no “one size fits all” solution exists. Each country or context has different sets of priorities, operational constraints, and monitoring requirements (for example, see this [repository of in-service teacher professional development programs](#)).

How do I find a project team to help me build a coaching app?

Try to leverage existing experience. Begin by checking with technology leads within your unit to identify developers and firms who have worked on coaching apps in the past. If they cannot help you, they can likely point you toward finding team members with experience in building digital global public goods.

When hiring a firm to help build a coaching app, what are some key questions to ask in the search process?

When engaging with a firm, it is crucial to gauge its experience and expertise in building apps that are similar in scope to what is desired. Experience with the platform and technologies involved is important. If building an Android app, experience with the platform in low-connectivity environments should be assessed, for example. A review of previous designs is beneficial in assessing whether the firm’s approach to interfacing with users fits the context for which the app will be built. Finally, a deployment strategy and data security strategy should be discussed to ensure the firm understands any particular requirements about how the app is to be deployed and data security and privacy requirements.

What is application hosting and how do I find a host?

Application hosting is typically provided by a third-party partner to provide hardware, software, and network connectivity necessary to run the backend and other elements of your app. To find a hosting provider, consider the following factors:

1. Your app’s technical needs in terms of storage, processing, network bandwidth, and security features should be identified.

2. To mitigate any potential network bandwidth or latency issues, the geographical location of the host should be as close to the implementation country as possible. The local government may place additional requirements on the geographical location for servers that host the app.
3. A record of reliability and customer service is crucial to ensure your host provides as much uptime as possible. You can review potential host providers online through Web searches in addition to interviewing their sales teams.

What are application software frameworks? How should I select them?

Application frameworks are prewritten scaffolds that allow software to be developed more efficiently and securely than by building an app from scratch. Depending on your app's operating needs, the app development team may recommend a set of frameworks to be used.

Can I incorporate multimedia content, such as videos and audio, in an app?

Yes, but keep in mind that network bandwidth and/or device storage may be limited. Consider using multimedia content sparingly or using compressed, low-file-size videos, audio, or images to conserve bandwidth and storage.

How can I incorporate user feedback to improve my app?

When possible, pilot your app with a small group of users to gain insight into how they use the app and where improvements may be made. When an app is "live" in the field, consider incorporating a user feedback form in your coaching app that users can complete to provide feedback. Analytics tools can provide insight into app usage, such as how often an app is used, where it was used, and who uses it.

How can I measure the success of my coaching app, given resource constraints and limited access to data? What metrics should I use to track its performance and impact?

Consider using approaches that are not resource intensive, using data already available through the app, such as user engagement, frequency of use (retention), and longitudinal changes in teachers' coaching scores. It is recommended to build such analytics through the app's administrative interface. If time and resources allow, qualitative data may be gathered through user surveys and focus groups.

Annex 2: Example Methodology for Selecting a Coaching Platform

An initial landscape review conducted by the World Bank Group in 2021 investigated six coaching platforms for analysis to acquire both an understanding of the breadth of options available and the depth of solutions that may be deployed in low-resource development contexts, especially identifying those that are effective, replicable, and cost-effective. The analysis focused on each platform's technical capabilities to collect data on teacher performance and provide coaching feedback based on observation data, either automated or through a pedagogical leader. Given ongoing work in low-bandwidth settings, these variables were considered essential in a potential app:

1. **Orientation toward low-tech-skilled users:** Solutions that are designed for users with low technology skills or limited access to technology are preferred. This is to facilitate universal ease of use and access to the tool, requiring little to no prior technical knowledge.
2. **Minimum technology requirements:** For both data collection servers and field collection devices, it is important to gain an understanding of minimum hardware configurations required to provide insight to factors that impact total implementation cost. Functionality on low-end hardware, such as older smartphones and tablets, is preferred.
3. **Offline capability:** Capabilities to operate in low-connectivity and non-Internet-connected environments and offline capable tools are preferred to accommodate clients in these settings.
4. **Operability with Google Chrome:** Functionality with the Google Chrome Internet browser is preferred due to its near-universal availability on various devices, including smartphones and tablets.
5. **Operability on Android devices:** Android compatibility as a stand-alone app is preferred because Android is the dominant operating system used in mobile devices in low- and middle-income countries.
6. **Capability for GPS tracking:** Monitoring of precise locations where data are collected aids in the transparent tracking and evaluation of resources expended during a coaching campaign.
7. **Ease of implementation for client countries:** As technical capabilities vary across World Bank Group projects and use by client countries, this variable assesses the level of technical difficulty in implementation; that is, whether a solution is turnkey and easy to adapt and implement or requires additional interventions from a specialist.
8. **Open-source software license:** This variable is an indicator of whether software used for the tool is commercial/proprietary or is open-source licensed for adapting, remixing, and sharing by its user community. As the World Bank Group produces global public goods, complimentary open-source licenses are preferred.
9. **Cost/pricing model:** This variable provides an overview of one-time and ongoing costs related to software license fees, administration, and maintenance.

After an initial review for potential suitability and based on matching project criteria, the list of six candidate platforms was reduced to two preferred solutions: Tangerine by RTI²⁵ and Inspiring Teachers.²⁶ Data were collected through each provider's/project's website and by interviewing each organization directly.

At the time of the assessment, only Tangerine was available for testing, and it was thus recommended to proceed with development of a pilot coaching product using Tangerine to gain insights into the assessment/coaching tool, and feedback for further improvements for eventual future releases, including those that could be considered global public goods. Following the pilot, the Bank chose to develop an independent platform to provide a tool for clients with an experience that could be focused more on country-level needs and implementation requirements. These experiences informed the formation of subsequent products and this guidance note.

25 <https://www.rti.org/impact/tangerine-mobile-learning-assessments-made-easy>

26 <https://inspiringteachers.org/platform>

Annex 3: Terms of Reference for Mobile Coaching App Development Teams

- **Project leader**, stakeholder liaison
 - Identifies all project stakeholders, including internal teams, external clients, end users, and third-party vendors. Analyzes their interests, influence, and importance related to the project to develop a strategic approach for engagement and communication.
 - Crafts a comprehensive communication plan that outlines the communication objectives, frequency, channels, and methods tailored for each stakeholder group.
 - Establishes and implements a structured process for receiving and integrating stakeholder feedback into the project lifecycle.

- **Product owner**, system architect
 - Liaises with and translates design needs for app from *Coach* team into actionable components for development.
 - Takes lead on system architecture and development operations.
 - Leads quality assurance (QA) efforts in collaboration with the development team.
 - Leads efforts to document digital coaching product.
 - **Deliverable(s)**: Responsible for professional, working version of coaching application for implementation in target environment.

- **Sprint manager**, co-architect for digital coaching deliverable
 - Develops sprint management:
 - Leads technical discussions with development team regarding architectural decisions, integration, and interoperability strategies.
 - Ensures weekly goals are clear to the whole team, running sprint planning and review meetings and development standup meetings, and troubleshooting as necessary.
 - Manages stories, tasks, and bugs on the sprint management tool for each deliverable, using the Agile method and organizing with selected project management tool.
 - Breaks down user stories, technical tasks, and bugs on the sprint board, making sure there is always someone assigned to solve the issue or tackle the task. Follows up regularly with each team member to ensure sprints and deliverables are completed on schedule.
 - Conducts product testing and debugging and supports frontend and backend development, as necessary, to ensure deliverables are met on time and at the highest quality possible.
 - Coordinates integration with existing client systems, as necessary.
 - **Deliverable(s)**: Daily management of app development and testing/bug fixing

- **Coaching/pedagogical specialist** (optional)
 - Develops (or adapts) a coaching strategy to enhance the quality of teaching in the targeted context.

- Collaborates with development team to provide guidance on digital coaching adaptation.
- Coordinates with ministries and other partners to ensure app meets local needs for enhancing the quality of teaching.
- Responsible for creating adapted coaching and mentoring materials for the target context to be translated into an app flow by the development team.

■ Backend developer

- Takes the lead as developer of the API, data model, and data-fetching technical tasks using the selected and agreed technical stack.
- Communicates regularly and keeps backend tasks always clear, well-described, and up to date on the sprint board.
- Discusses, clarifies, and structures backend user stories, making sure users' needs are always addressed.
- Develops testing cases and scenarios for all APIs and general code.
- Addresses all back-and-forth tasks from daily QA checks.
- Proactively coordinates/collaborates with frontend developer and UI/UX designer as necessary.
- **Deliverable(s):** Responsible for leading backend development.

■ Frontend developer

- As lead developer of the frontend app, ensures the design-produced components are developed according to the design system.
- Communicates regularly, keeps frontend tasks always clear, well-described, and up to date on the sprint board.
- Discusses, clarifies, and structures UI user stories, making sure users' needs are always addressed and incorporating best UX practices.
- Develops testing cases and scenarios for all components and app in general.
- Addresses all back-and-forth tasks from daily QA checks.
- Proactively coordinates/collaborates with backend developer and UI/UX designer as necessary.
- **Deliverable(s):** Responsible for leading frontend development

■ UI/UX designer

- Keeps design tasks always clear, well-described, and up to date on the sprint board.
- Runs user research and discovery processes to capture needs and turn them into goals.
- Quickly wireframes solution possibilities to validate them with clients, users, and other *Coach* stakeholders.
- Ensures app design meets Web Content Accessibility Guidelines (WCAG 2.1 or newer).
- Designs mobile-first, low-fidelity, and high-fidelity components and screens to be implemented by frontend developer.
- Mediates design reviews and design critiques with the whole team.
- Proactively coordinates/collaborates with backend and frontend developers as necessary.
- **Deliverable(s):** Responsible for leading design of final product

Annex 4: Checklist for Developing a Digital Coaching App

This annex provides a checklist for developing a digital coaching app in developing country contexts. This checklist is designed to be a practical tool, guiding teams through each phase of development with clarity and purpose, ensuring a user-centric, sustainable, and impactful app.

Pre-implementation

Project planning and leadership:

- a. **Project leader and team selection:**
 - » Identify and select a project leader with relevant experience and expertise.
 - » Assemble a multidisciplinary team (including technical experts, education specialists, and local community representatives).
- b. **Stakeholder identification and engagement:**
 - » Identify all stakeholders (teachers, coaches, students, policymakers, etc.).
 - » Develop a strategy for consistent and meaningful stakeholder engagement.

STEP

1

Foundational questions answered to frame the local context:

- a. **Needs assessment:** Conduct a needs assessment to understand local educational challenges and specific requirements.
- b. **Cultural and linguistic adaptation:** Ensure the app will align with the cultural and linguistic contexts of target users.
- c. **Local legislation and data privacy:** Understand and adhere to local regulations regarding data protection, privacy, and access.

STEP

2

Application architecture and framework selection:

- a. **App flow:** Develop a flow that prioritizes identified skills, digital literacy level of users, and technical expertise of pedagogical leaders.
- b. **Scalability and flexibility:** Choose an architecture that allows the app to scale and adapt to evolving needs.
- c. **User accessibility:** Ensure the framework supports building an app with a user-friendly interface and accessible features.
- d. **Offline capability:** If necessary, ensure the app is functional offline, considering possible Internet connectivity issues in certain areas.

STEP

3

Organization of the development cycle:

- a. **Agile development approach:** Consider using a Scrum or Agile approach to accommodate changes and ensure iterative development.
- b. **Timelines and milestones:** Develop a comprehensive project timeline with clear milestones and deliverables.
- c. **Risk management:** Identify potential risks and create mitigation strategies.

Implementation

STEP

4

Piloting, refinement, and deployment:

- a. **Pilot testing and focus groups:**
 - » Conduct a small-scale pilot in a representative setting.
 - » Collect feedback from pilot users and stakeholders.
- b. **Refinement:** Address issues and implement enhancements based on pilot feedback.
- c. **Deployment strategy:** Develop a phased deployment plan, ensuring initial launch is in a controlled environment before scaling up.
- d. **Monitoring and evaluation:** Establish a robust monitoring and evaluation system for ongoing app performance review.

Continuous support and maintenance:

- a. **Technical support:** Ensure continuous technical support for end users.
- b. **Strategy for updates and upgrades:** Plan for regular app updates and technological upgrades.
- c. **User training and support materials:** Develop comprehensive user manuals, training modules, and support materials.

Data management and analysis:

- a. **Data collection strategy:** Establish clear protocols for data collection, ensuring reliability and validity.
- b. **Data security and compliance:** Implement stringent data security measures and ensure compliance with local and international data protection regulations.
- c. **Data utilization:** Create a strategy for effective use of collected data for policy decisions and further research.

Post-Implementation

STEP

5

Scaling up and sustaining the project:

- a. **Scalability plan:** Develop a plan to scale the initiative, ensuring stability and sustainability.
- b. **Partnership and collaboration:** Explore sharing your product and forming partnerships with other governments, nongovernmental organizations, and international organizations to further iterate, broaden impact, and enable product sustainability.

**BUILDING A MOBILE
APPLICATION FOR
TEACHER COACHING**