Terms of References

Software Engineer

Project Background:

The SELECT Project encompasses a multi-pronged approach towards improving the quality of both teaching and learning practices in primary education, with a particular emphasis on foundational reading in grades 1 through 5. The Project comprises a series of focused and flexible implementation strategies, targeted at the school and meso-levels (personnel and systems at the school, taluka and district levels). The Project supports improvements in the transition from primary to elementary school, as well as a reduction in dropouts through targeted student attendance redress procedures. Desired Project outcomes would eventually contribute to reductions in learning poverty and in the number of out-of-school children.

(Original) Main Project Amount	IDA: US$100 million GPE ESPIG: US$29.9875 million GPE MG: $24.775 million Total: US$154.7625 million
Expected Project Duration	August 2021 – April 2026

Project Objectives	The overall development objective of this Project is to improve the reading skills of early grade primary students and increase student retention in primary schools in selected districts.
Project Cost	IDA: US$100 million GPE ESPIG: US$29.9875 million GPE MG: $24.775 million Total: US$154.7625 million
Expected Project Duration	August 2021 – April 2026
Component 1	Transforming teaching practices in the early grades • Subcomponent 1.1: Implementation of a Continuous Professional Development (CPD) model for improved literacy skills in the early grades • Subcomponent 1.2: Behavioral nudges for improved learning • Subcomponent 1.3: Technical Assistance (TA) for transforming teaching practices Under this component, a CPD model will be implemented with the aim of improving literacy skills in early grades. Behavioral nudges will be utilized to improve student wellbeing and mitigate potential risks of dropping out. TA will also be provided for institutional capacity building and support.
Component 2	Improving the physical learning environment in selected primary schools, and upgrading them from grade 5 to grade 8, supporting the teaching and learning aims set out in Component 1 and the student retention aims set out in Component 3. Cost-effective and carbon-efficient technologies will be utilized to introduce needed climate adaptations and mitigate climate risk.
Component 3	Improving system capacity for effective school leadership and management support:

	• <u>Subcomponent 3.1:</u> Establishing a technology-based student attendance monitoring system • <u>Subcomponent 3.2:</u> TA and capacity building for school leadership and local education office management to mitigate student dropout A technology-based student attendance monitoring system will be established. TA will be provided, and capacity building will take place for school leadership and local education office management increase their ability to use school-level data in conjunction with Component 1 activities to mitigate student dropout.
Component 4	The Reform Support Unit (RSU) will monitor and evaluate the Project, monitor safeguards, oversee procurement and financial management, and will be responsible for overall management and coordination of the Project on behalf of the School Education and Literacy Department (SELD).
Geographic Scope	The Project will be implemented in twelve selected districts in Sindh: Badin, Ghotki, Jacobabad, Kambar-Shahdadkot, Kashmore, Mirpurkhas, Mitiari, Sanghar, Shikarpur, Sujjawal, Tando Muhammad Khan, and Thatta.

1. Implementation Arrangement

The Project will be implemented by SELD of the Government of Sindh (GoS), through the Project Management and Implementation Unit (PMIU). This will be housed in the RSU, which will monitor overall implementation of Project activities with TA support. The RSU will be headed by the CPM (Chief Programme Manager) who will be responsible for providing overall Supervision.

The design, implementation planning and construction supervision activities for the Component will be managed through the consulting firm. The firm will be hired by the RSU and will be responsible for conducting needs assessment, preparing site specific master plans and detailed designs and drawings, construction supervision and quality assurance of the Project.

2. Scope of Work

The responsibility of a proficient Software Engineer encompasses overseeing the entire software development life cycle (SDLC). This includes designing layouts, creating flowcharts, and generating standardized documentation tailored to project requirements and solutions. They are tasked with crafting and implementing standardized code, as well as assessing specifications and operational feasibilities. Furthermore, they develop new applications or add modules to existing ones, integrating software components seamlessly into systems. They also focus on improving the scalability of mobile and web application systems by reviewing and potentially rewriting code. Additionally, they contribute to the development of multiple reporting applications and dashboards, ensuring seamless integration with existing systems.

Direct supervision and directions of the Project Director/Component Lead the Expert Software Engineer shall perform the following tasks and responsibilities:
1. Understanding the development needs according to project requirements, considering long-term sustainability.
2. Creating Android and web applications, alongside integrations and scripts, with a focus on scalability and maintainability.
    - For Android development, proficient in React Native, Kotlin, and Flutter.
    - For web applications, skilled in PHP with Laravel, JavaScript and TypeScript, Node.js, React.js, and MySQL/SQL databases.
3. Utilizing build tools like Webpack and package management tools like Yarn & NPM.
4. Writing test code, reviewing and rewriting code as per project requirements, and maintaining version control using Git and SVN.

5. Designing, developing, and maintaining API-driven solutions, including the implementation of web services interfaces using REST APIs.
6. Integrating APIs, including specifying the types of APIs used and platforms integrated.
7. Applying software development principles such as Agile and Scrum methodologies, waterfall model.
8. Updating, maintaining, and adhering to pattern libraries, style guides, and site documentation.
9. Providing regular updates on project status, risks, and issues to relevant stakeholders.
10. Troubleshooting and resolving any issues with systems and databases.
11. Demonstrating a good understanding of MVC frameworks and applying SOLID principles/design patterns while coding.
12. Writing test cases for code and developing and maintaining documentation for systems and configurations.
13. Supporting the delivery of projects and services.
14. Engage in continuous learning as needed and seek guidance from MIS Team.
15. Conduct weekly code reviews with developers, followed by consultation and feedback sessions for necessary improvements.
16. Emphasize modularity, reusability, and efficiency in code development.
17. Identify and implement optimizations for database and table indexing.
18. Provide technical design documentation and comprehensive code commenting for assigned modules and support in prototyping any modules as required.

Expected Outputs:
- Initial and final development detailed plans and evaluations of the start status and final status.
- Detailed infrastructure/architectural specifications document including hardware and software systems diagrams.
- Developed applications, integrations, databases, and deployed applications.
- Bi-weekly progress reports.
- End-of-mission report that concludes the mission and assesses it.
- All related electronic materials acquired as part of the project, to be available with MIS team at all times.
- All necessary documentation (hardware and software) to maintain and depict the sites where the software has been installed and all related passwords, available to lead resource and project management at all times.
- Procedure of backup and the disaster recovery plan for service continuity.
- Any other information related to the system.
- Ensure compliance with ISO 27001 and CMMI standards.

Qualifications of the Successful Individual:
1. **Education**: Minimum 16 years of education from an HEC recognized university with in Computer Science / Software Engineering or in any relevant discipline from HEC recognized university.
2. **Experience**: At least 3 years of relevant experience in software development, with specific expertise in:
    1. Proficiency in Android application development with technologies React-native, Kotlin, Flutter.
    2. Experience in JavaScript frameworks and libraries such as React.js, Node.js and Vue.js.
    3. Proficiency in PHP/Laravel, and MySQL/SQL.
3. **Note:** Proficiency in Android application development is essential, but candidates with practical skills and expertise in PHP/Laravel, JavaScript/TypeScript, Node.js, React.js, and MySQL/SQL are preferred.