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Report No: PAD4218

INTERNATIONAL DEVELOPMENT ASSOCIATION
PROJECT APPRAISAL DOCUMENT
ON A
GLOBAL PARTNERSHIP FOR EDUCATION GRANT
IN THE AMOUNT OF US\$6.7 MILLION
TO THE
CO-OPERATIVE REPUBLIC OF GUYANA
FOR AN
EDUCATION SECTOR PROGRAM PROJECT
June 18, 2021

Education Global Practice
Latin America and Caribbean Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective May 31, 2021)

Currency Unit =	GYD
GY\$209.21 =	US\$1
US\$1.44 =	SDR1

FISCAL YEAR

January 1 - December 31

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ABBREVIATIONS AND ACRONYMS

IADB	Inter-American Development Bank
CA	Coordinating Agency
CARICOM	Caribbean Community
CEN	Country Engagement Note
CPCE	Cyril Potter College of Education
DA	Designated Account
DEOs	District Education Officers
ECE	Early Childhood Education
EMIS	Education Management Information System
ESCP	Environmental and Social Commitment Plan
ESRS	Environmental and Social Review Summary
ESP	Education Sector Plan
ESS	Environmental and Social Standards
FM	Financial Management
FY	Fiscal Year
GDP	Gross Domestic Product
GECEP	Guyana Early Childhood Education Project
GESIP	Guyana Education Support Improvement Project
GPE	Global Partnership for Education
GoG	Government of Guyana
GRS	Grievance Redress Service
GRM	Grievance Redress Mechanism
GSEIP	Guyana Secondary Education Improvement Project
HLO	Harmonized Learning Outcomes
ICR	Implementation Completion and Results Report
IDA	International Development Association
IFRs	Interim Financial Reports
IPF	Investment Project Financing
IPP	Indigenous Peoples Plan
LAC	Latin America and the Caribbean Region
LCDS	Low Carbon Development Strategy
LEG	Local Education Group
M&E	Monitoring and Evaluation
MOE	Ministry of Education
NCERD	National Center for Educational Resource Development
NDA	Nursery Diagnostic Assessment
NPF	New Procurement Framework
NPTAB	National Procurement and Tender Administration Board
PDO	Project Development Objective
PIU	Project Implementation Unit
SEP	Stakeholder Engagement Plan

SPDs	Standard Procurement Documents
STEP	Systematic Tracking and Exchanges in Procurement
UG	University of Guyana
UGSTSP	UG Science and Technology Support Project
UNICEF	United Nations Children's Fund
WB	World Bank
WHO	World Health Organization



TABLE OF CONTENTS

DATASHEET	Error! Bookmark not defined.
I. STRATEGIC CONTEXT	6
A. Country Context.....	6
B. Sectoral and Institutional Context	7
C. Relevance to Higher Level Objectives.....	10
II. PROJECT DESCRIPTION.....	11
A. Project Development Objective	11
B. Project Components	12
C. Project Beneficiaries	17
D. Results Chain	18
E. Rationale for Bank Involvement and Role of Partners	18
F. Lessons Learned and Reflected in the Project Design	20
III. IMPLEMENTATION ARRANGEMENTS	21
A. Institutional and Implementation Arrangements	21
B. Results Monitoring and Evaluation Arrangements.....	21
C. Sustainability.....	22
IV. PROJECT APPRAISAL SUMMARY	22
A. Technical, Economic and Financial Analysis	22
B. Fiduciary.....	24
C. Legal Operational Policies.....	25
D. Environmental and Social.....	25
V. GRIEVANCE REDRESS SERVICES	26
VI. KEY RISKS	27
VII. RESULTS FRAMEWORK AND MONITORING	28
ANNEX 1: Implementation Arrangements and Support Plan.....	35
ANNEX 2: Economic Analysis.....	40



DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Guyana	Guyana Education Sector Program Project	
Project ID	Financing Instrument	Environmental and Social Risk Classification
P174244	Investment Project Financing	Moderate

Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input checked="" type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
18-Jun-2021	30-Jun-2024

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The objective of the Project is to: (i) improve learning conditions at the nursery level in select areas; (ii) increase use of technology-assisted learning at the primary level in select areas, and (iii) improve functionality of the education management information system nationally.



Components

Component Name	Cost (US\$, millions)
Improving Learning Conditions at the Nursery level	2.30
Promoting Technology-Assisted Learning at the Primary level	2.50
Strengthening Institutional Capacity and Project Management	1.90

Organizations

Borrower: Co-operative Republic of Guyana

Implementing Agency: Ministry of Education

PROJECT FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	6.70
Total Financing	6.70
of which IBRD/IDA	0.00
Financing Gap	0.00

DETAILS

Non-World Bank Group Financing

Trust Funds	6.70
Education for All - Fast Track Initiative	6.70

INSTITUTIONAL DATA

Practice Area (Lead)

Education

Contributing Practice Areas



SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	● Low
2. Macroeconomic	● Low
3. Sector Strategies and Policies	● Low
4. Technical Design of Project or Program	● Moderate
5. Institutional Capacity for Implementation and Sustainability	● Moderate
6. Fiduciary	● Moderate
7. Environment and Social	● Moderate
8. Stakeholders	● Low
9. Other	
10. Overall	● Moderate

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

Yes No

Does the project require any waivers of Bank policies?

Yes No



Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Not Currently Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Not Currently Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Relevant
Cultural Heritage	Not Currently Relevant
Financial Intermediaries	Not Currently Relevant

NOTE: For further information regarding the World Bank’s due diligence assessment of the Project’s potential environmental and social risks and impacts, please refer to the Project’s Appraisal Environmental and Social Review Summary (ESRS).

Legal Covenants

Sections and Description

The Recipient, through the MOE, no later than sixty (60) days after the Signature Date of the Grant Agreement, shall establish, and maintain throughout Project implementation, a Project Implementation Unit (“PIU”) with adequate structure, staff, functions, responsibilities and resources, all acceptable to the Bank. (Grant Agreement, Schedule 2, Section I.A.)

Sections and Description

No later than sixty (60) days after the Signature Date of the Grant Agreement, the Recipient, through the MOE, shall prepare, adopt and subsequently carry out the Project in accordance with a project operations manual (“Project Operations Manual”) acceptable to the Bank, which shall contain detailed workflow, methods and procedures for the implementation of the Project.” (Grant Agreement, Schedule 2, Section B.1).



Conditions



I. STRATEGIC CONTEXT

A. Country Context

1. The Co-operative Republic of Guyana is a small, sparsely populated country in South America with abundant natural resources. Guyana has fertile agricultural lands, bauxite, gold and extensive tropical forests that cover 80 percent of the country, as well as recently discovered large offshore oil and gas (O&G) reserves. Guyana is an ethnically diverse society, encompassing Indo-Guyanese, Afro-Guyanese, Mixed-Guyanese, indigenous Amerindian and others. Guyana has a low population density, with 90 percent of its 779,004 inhabitants living on the narrow coastal plain, which represents 10 percent of the country's area.

2. Despite natural resources, Guyana has one of the lowest gross domestic product (GDP) per capita in South America at US\$6,610 in 2019, and a relatively high level of poverty at 48.4 percent compared to other countries in the Latin American and Caribbean (LAC) region. Resource-based development has created a limited number of jobs and has contributed to low levels of development outcomes and high emigration rates, with 39 percent of all Guyanese citizens currently residing abroad and roughly half of all Guyanese with a tertiary education having emigrated to the United States. With an economy that is heavily dependent on natural resources, agriculture, and remittances, Guyana is vulnerable to adverse weather conditions, commodity price fluctuations, and economic conditions in migrant destination countries. Economic diversification beyond natural resources and agriculture remains a challenge. Sugar, gold, bauxite, shrimp, timber, and rice represented over 80 percent of the country's exports in 2014. Remittances were equivalent to approximately 11 percent of GDP that year, mainly sent from the diaspora communities in the United States and Canada. Despite overall declining poverty trends, poverty remains entrenched amongst geographic and ethnic lines. Poverty rates are highest in the sparsely populated interior, in particular in Amerindian populations, where communities have limited access to economic opportunities, healthcare and public services.

3. Due to the recent oil discovery, Guyana stands at the threshold of a new era. The discovery of vast offshore O&G reserves and production is poised to fundamentally transform the structure of the Guyanese economy while generating an influx of fiscal revenue. The rise of the O&G sector poses unprecedented macro-fiscal management challenges while offering new opportunities to address longstanding development constraints. However, for high-income status to reflect meaningful gains in general wellbeing, Guyana must improve its human capital development and health indicators, as well as reduce poverty levels while maintaining macroeconomic stability and environmental sustainability.

4. A highly educated and skilled workforce is a prerequisite to continued diversification of the economy and harnessing of the country's resources in a way that supports sustained growth. The priority in the education sector is to raise learning outcomes to prepare students for obtaining knowledge and skills needed for the labor market. Equipping all school graduates with universal basic skills would also help reduce coastal/hinterland and ethnic income disparities by promoting inclusive growth through increased participation of the poor in the labor market. In addition, inclusive growth, made possible through universal achievement of basic skills, has the potential to help reduce poverty.



5. The outbreak of the coronavirus disease (COVID-19) was declared a Public Health Emergency of International Concern on January 30, 2020, and, like most other countries, the virus spread to Guyana. The crisis is stretching the public health systems and threatening the economy. In line with international best practices, the Government enacted several mitigation measures, including a shutdown on many non-essential services from April 9, 2020, to the present. The order includes restrictions on travel, social, and economic activities. In addition, the Ministry of Education (MOE) closed public schools nationally from March 13, 2020. Effective November 9, 2020, MOE began a phased reopening of public schools with grades 10-12 students returning to school based on a rotation schedule and restricted timetables. Schools remain closed for all other grades. All practical instruction and technical vocational educational centers have been reopened. Strict distancing guidelines and sanitation protocols have been put in place with teachers and students receiving face masks, shields, sanitizing agents, vitamins, and care packages. Additionally, handwashing sinks have been installed at schools, thermometers have been provided, and students will be given a diagnostic wellness kit.

B. Sectoral and Institutional Context

6. Guyana's education sector has made remarkable progress in the last 15 years and continues to be a priority for Government investment. In particular, Guyana has achieved near-universal primary education enrollment (92 percent in 2018).¹ Access to secondary education continues to lag at 61 percent enrollment in 2018, but the sector is expanding rapidly.² Although not compulsory,³ access to nursery (pre-primary level) is relatively high, at 88 percent (public and private) in 2018. Public expenditure on education as a share of GDP has increased over time from 4 percent in 2013 to 5.6 percent in 2018, and is in line with international norms⁴ and higher than in most regional peers. Education spending out of total public spending (excluding debt servicing) also shows a recent upward trend, with an increase of 5 percentage points from 12.3 percent in 2013 to 17.8 percent in 2018.⁵ The largest share of the education budget goes to secondary education at 34 percent, followed by primary education with 31 percent, and nursery at 15 percent.⁶ The per-student spending in nursery education is above the average expenditure in other Caribbean small states and close to the Organization for Economic Co-operation and Development average, while spending in primary and secondary education is comparatively lower than both of these benchmarks.

7. Despite improvements in access to education at all levels, learning outcomes remain low. International and regional assessments of learning outcomes suggest that one of the major bottlenecks of the Guyanese education system is fully supporting the development of foundational skills for its students. The Harmonized Learning Outcomes (HLO), an international database built by the World Bank that compares international and regional standardized achievement tests,⁷ reveals that Guyana had the

¹ Education Strategic Plan (ESP) 2021- 2025, MOE 2020.

² Including through the construction of schools, such as through the ongoing Guyana Secondary Education Improvement Project.

³ Nursery education is available for children at the age of three years and six months for two years (optional). Primary education starts at the age of five years and six months, with a duration of 6 years. Secondary education lasts between three (compulsory to age 15) and five years (optional).

⁴ Expenditure on education is in line with what was recommended in The Third International Conference on Financing for Development: at least 4 percent to 6 percent of GDP.

⁵ ESP 2021-2025

⁶ Guyana Public Expenditure Review (draft)

⁷ For details on the methodology see (Patrinos & Angrist, 2018).



17th poorest results among 157 countries/territories across the world included in the database. Furthermore, according to the Human Capital Index, the average Guyanese student is expected to complete 12.2 years of schooling, but this is equivalent to only 6.8 years of learning, as expressed in the Learning-Adjusted Years of school.⁸

8. National assessments bear out similarly low levels of learning across the education system. The MOE's Nursery Diagnostic Assessment (NDA),⁹ administered in September 2015 to 7,100 first- and second-year nursery students nationwide, showed that only 50.5 percent of students in the coastal regions attained an "approaching mastery" level of emergent literacy. Their peers in the hinterland scored even lower at 39.6 percent. For emergent numeracy, 53.5 percent of nursery students in the coastal regions attained an "approaching mastery" level, versus 41.9 percent of students in the hinterland.¹⁰ In 2016, only 14 percent of grade 2 students achieved scores indicating they "attained the standard" in literacy and numeracy; 41 percent were "approaching standard" and 45 percent "below standard." Math is a particular area of challenge; in the 2019 National Grade Six Exam, less than 45 percent of students attained a passing grade in mathematics. This poor performance persists through secondary school, with the Caribbean Secondary Education Certificate grade 11 exam results for 2018 showing only 53 percent of students attaining a mathematics passing grade. These results indicate low levels of learning across the system, as well as equity challenges both between genders and between the coastal and hinterland regions.

9. Learning outcomes will potentially weaken even further as a result of the outbreak of COVID-19 and its disruptions on the education system. As a result of the closure of public schools nationally, over 169,743 children who are enrolled in public schools are now out of school. This places at high risk the gains made in access to education, as well as to learning at all levels, and increases the risk of student dropouts. Until all schools can reopen, the Government is modifying its approach to the upcoming school year and investing in activities that are designed to support both the current distance learning stage and learning recovery in the medium to long term. These include support to home-based learning through online technology, television, radio, and print materials, as well as continued support to ongoing reforms with longer-term implications, such as the implementation of the new curriculum and investment in an education management information system.¹¹

10. Low school readiness in nursery is the result of outdated curriculum, pedagogical practices, and teaching materials, and inequities between various groups persist. Until recently, nursery education followed structured, didactic instructional methods instead of open-ended, play-based, and hands-on approaches that are more suitable for healthy child development and acquisition of abstract concepts.

⁸ For definition and methodology see <https://www.worldbank.org/en/publication/human-capital#Data>

⁹ The NDA, which provides data on children's preparedness for two years of nursery-level education, was first administered in September 2014 to a 10 percent sample of nursery students. The September 2015 sample was expanded to include 30 percent of all Nursery students nationwide. This sample was deemed large enough to yield generalizable data for the country.

¹⁰ NDA results for nursery students in the remote riverine areas spread throughout Guyana's coastal regions are included in overall coastland results. When separated out, these students have historically performed at the same (lower) levels as children in the Hinterland, and therefore were also targeted by the ECE Project.

¹¹ Amongst other efforts, the Government has embarked on a project responding to COVID-19 financed by a grant from the Global Partnership for Education (GPE), managed by UNICEF, supporting continuity of learning for all children; psychosocial support to children, teachers and parents; and the return to school in safe, protective learning environments. World Bank and UNICEF will work closely together to ensure complementarity of interventions, in particular on learning continuity.



Thirty-one percent of Guyana's 1,700 nursery teachers remained untrained,¹² with a much higher proportion of untrained teachers (53 percent) in hinterland areas, and learning materials are often locally made and not aligned with the nursery curriculum. The curriculum—defined as not only learning standards for children, but also as the expectations for how teachers would deliver content in the classroom—is currently being reformed under the ongoing Guyana Education Sector Improvement Project (GESIP, P159519, Credit 6009-GY). Although under GESIP the curriculum and teaching guides will be produced, gaps remain in teacher training and supply of textbooks and other learning materials. A recent report on out-of-school children in Guyana revealed that non-participation in nursery was highest in regions 1, 2, 7 and 8 (which are all hinterland and riverine areas where the geographical terrain is challenging to navigate for children in this age cohort) and lowest in coastal regions.¹³ The attendance rate of children in urban areas was 69 percent, against 59 percent for those in rural areas.¹⁴ Poor learning at the nursery level leads to low school readiness and a lack of foundational skills which persists throughout schooling. Tackling these are critical to improving education quality and equity in Guyana.

11. Quality of education at the primary level is constrained by teachers' limited qualifications and capacity to teach at the right level, especially in rural areas. A lack of teachers' qualifications restricts teacher effectiveness to engage students in learning, particularly in managing students at different levels through differentiated instruction. The lack of qualified teachers is even more pronounced in areas where students are already vulnerable, which further exacerbates inequities. The Government has taken measures to improve teachers' qualifications, including through the training accompanying the updated curriculum under GESIP. In addition, the Government has begun to explore the use of technology to support learning and teaching at the right level for students, in particular, through the use of smart classrooms and tablets at the secondary level, supported through the ongoing Guyana Secondary Education Improvement Project (GSEIP, P147924, Credit No. 5473-GY). Access to tablets can enhance student learning as part of regular schooling through engaging students in a different way and allowing progress at individual rates, ensuring learning continuity during distance learning when schools are closed, while helping make up for learning losses once schools reopen. This can help to mitigate the increasing inequities likely to arise between students that have access to technology at home and those that do not, provided connectivity is present or through offline programs, and with continued engagement of teachers. Smart classrooms can also support in-classroom learning and link classrooms to homes during school closures or in the implementation of hybrid learning models once schools reopen, potentially on a part time schedule.¹⁵ The Government aims to bring these interventions to the primary level to improve learning at this level during the COVID-19 pandemic and going forward, as well as to ensure a smoother transition to Secondary.

12. Education sector management is also a constraint for effective and efficient management of the system to support learning. The MOE's ability to collect, analyze and use school-level data to improve sector planning and policymaking, and ultimately help guide the system towards higher quality and education outcomes, has been constrained by an outdated statistics information system. Currently, data

¹² A trained teacher has received a teaching certificate from the Cyril Potter College of Education (either through its main campus outside of Georgetown or one of its satellite learning centers), or the University of Guyana's School of Education.

¹³ Guyana Out of School Children Study - September 2017, Page 34.

¹⁴ Bureau of Statistics, Ministry of Public Health and UNICEF, 2015

¹⁵ Hybrid models could, for example, involve teachers in schools and students at home; or half of the students at home and half in school. In both cases, smart classrooms can facilitate continued teaching.



questionnaires are distributed to schools once per year, which teachers fill out manually. Once the forms are re-transmitted to the MOE, often with long delays, the Planning Office manually inputs data into static access database files separated by year, making time series analysis cumbersome and time-consuming. Real-time tracking of teacher assignments and qualifications is not possible, hampering efforts to match schools with the number of qualified teachers they need. Under the ongoing GSEIP, the Government piloted an Education Management Information System (EMIS) at the secondary level, currently being used in select schools to record student and staff attendance and assessment data. The Government is now embarking on a broader effort to improve data management of the system across all levels. A policy on education system management is currently being drafted, and MOE are looking to roll out a national-level EMIS. The national level EMIS will aggregate data from all levels of education¹⁶ and have interoperability with other systems, such as learning platforms and HR systems. It will also include statistical reporting tools to allow creation of dashboards and execution of analysis on data in real time to inform the management of the sector. A strong EMIS could also help design a good early warning system for youth at risk when schools reopen, as their vulnerabilities may have been exacerbated by the health crisis.

C. Relevance to Higher Level Objectives

13. The proposed Project directly supports one of the three objectives of World Bank Group’s Country Engagement Note for the period FY16-18, discussed by the World Bank Board of Executive Directors on May 3, 2016 (Report No. 94017-GY).¹⁷ The second of the three objectives is “setting up the foundations for high-quality education”, aiming to focus World Bank assistance on the development of human resources and capacity for more effective teaching and learning throughout the school system in Guyana. The Systematic Country Diagnostic, presented to the Board on November 25, 2020, also highlighted low levels of human capital and education quality as key challenges for inclusive growth and poverty reduction in Guyana. The proposed Project would support the shared vision of education quality improvement at all levels, which is a necessary precursor to economic growth. Thus, the Project would contribute to the Government’s efforts to reduce poverty and increase shared prosperity for the population by investing in human capital. In addition, the activities remain a priority in the World Bank’s Learning for All Education Strategy 2020.¹⁸

14. The Project is aligned with Guyana’s Education Sector Plan (ESP) 2021-2025.¹⁹ The ESP sets five priorities: (i) improving governance and accountability; (ii) improving performance at all levels; (iii) improving the efficiency of the education system; (iv) reducing inequities in education; and (v) contributing to lifelong learning and employability. The Project will assist the Government in achieving these goals by focusing on improving performance at the pre-primary and primary level, supporting management of the system to improve governance and increase efficiencies, and targeting vulnerable students to reducing inequities, all of which would contribute to lifelong learning and employability for students. Specifically, Component 1 of the Project is aligned with Program 2.1 of the ESP: To ensure children at the nursery level demonstrate mastery skills in various competencies. The Project supports two of the strategies outlined, namely: 1. Institute school readiness programs focused on learning and parental attitudes and

¹⁶ The EMIS system used at the secondary school level (OpenSIS) will be a subsumed into the national EMIS.

¹⁷ A Systematic Country Diagnosis has been finalized and was disclosed on December 2, 2020 (Report No. 135127).

¹⁸ World Bank. (2011). Learning for all: Investing in people’s knowledge and skills to promote development. World Bank Group Education Strategy 2020.

¹⁹ Finalized on November 20, 2020.



involvement, and 2. Institute a compulsory continuous professional program for all nursery teachers. In addition, Component 1 is aligned with Program 4.1: To ensure equitable distribution of education resources and delivery across education districts, with specific emphasis on hinterland/riverine areas. By focusing components of the grant on the hinterland and riverine areas, the Project contributes to the core objective of reducing inequalities between regions. Component 2 of the Project is aligned with Program 2.2: To ensure learners at the end of primary demonstrate functional numeracy and literacy skills. The ESP emphasizes technology-assisted learning as an alternative to improve the quality of education; and in Program 2.3 includes the objective: To ensure STEM is embedded into the primary teaching-learning process. Technology assisted learning is highlighted in the ESP as a key component to improve the national approach to science and math education. Finally, Component 3 is aligned directly with ESP program 1.1: To strengthen resource development, management and accountability at central, regional and school levels, in particular through the establishment of an integrated education management information system.

15. The Project is also aligned with ongoing COVID-19 efforts, including the Public Education COVID-19 Response and Recovery document,²⁰ which focuses on continuity of learning for all children through online and non-online modalities, depending on the context of the child. The Project will contribute to the learning continuity and recovery for both modalities through provision of teacher/parental training, materials, and technology. The Project is designed to be adaptable in both fully distant and hybrid models, as well as a future full return to physical learning, as activities are flexible in all scenarios.

16. The Project is aligned with previous and ongoing Bank projects in Guyana. The Bank has a long-term engagement in Guyana and the projects build on each other towards Guyana’s education objectives. The GESIP is supporting revision of the curriculum across all grade levels, which this Project will support with teacher training at the nursery level. The GSEIP introduces tablets and smart classrooms at the secondary level; this Project will pick up this initiative at the primary level, to introduce this to students sooner and improve transition to the secondary level. The ongoing Education Public Expenditure Review (P172215) will inform the Bank’s engagements in the education sector.

PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

The objective of the Project is to: (i) improve learning conditions at the nursery level in select areas; (ii) increase use of technology-assisted learning at the primary level in select areas; and (iii) improve functionality of the education management information system nationally.

PDO Level Indicators

17. The following key results indicators are proposed for the Project:

²⁰ MOE, April 2020



- PDO Indicator 1 “Percentage of school teachers meeting standards in student-centered teaching practices at the nursery level.”
- PDO Indicator 2 “Percentage of students using educational technology at the primary level.”
- PDO Indicator 3 “Number of visitors to EMIS monitoring dashboard

PDO Indicator 1 will be measured by the Teach instrument, with standards to be set by the Government based on a diagnostic that will be completed near the beginning of the Project implementation. PDO Indicator 2 will measure hours spent on educational programs on the software, to determine technology use by students. PDO Indicator 3 will measure functionality of the EMIS by measuring visitation to its dashboard, which entails a functional data collection and storage system, and the design and deployment of useful data visualisations on an accessible platform.

B. Project Components

18. The proposed Project would support the Government’s efforts to address longer-term structural constraints in early childhood level, primary education and education sector management, while supporting continuity of learning and learning recovery in the short- and medium-term. The Project would achieve its development objective through the implementation of three components:

19. Component 1: Improving Learning Conditions at the Nursery level (US\$2.3 million). This component aims to improve teaching and learning conditions in both schools and homes to increase long-term school readiness. This will be achieved through three subcomponents: teacher training at the nursery level to improve pedagogy and delivery of the new curriculum, provision of accompanying materials to support learning, and parental education to support home-based learning.

20. Subcomponent 1.1: Teacher training to accompany the new curriculum (US\$1.5 million). This subcomponent would support the delivery of the reformed curriculum²¹ through training of all teachers and school administrators in Nursery 1 and 2. The training will include foundational skills, as well as student-centered pedagogy and formative assessment. The component would also provide follow-up mentorship and classroom observation using the open source Teach²² Early Childhood Development tool. The Teach tool would measure the improvement in teaching practices, which in turn would translate to improvements in student learning outcomes. Training will take place in person or online, to be determined and adapted as the public health situation unfolds. Digital options for administering Teach will be explored accordingly. The content would be delivered to hinterland teachers without internet access through regional hubs and by CD-ROM or other methods provided by traveling inspectors. Socio-emotional aspects will be included in the training, which are of particular importance during the current pandemic and can take a toll on students, parents, and teachers. The activities would also contribute to the successful transition of students from nursery to primary, as the curriculum has been designed to flow from one level

²¹ Using the new curriculum, which is currently being updated, supported by the ongoing Guyana Education Sector Improvement Project (GESIP, P159519).

²² Teach is a free classroom observation tool designed by the World Bank to help countries track and improve teaching quality. Teach is currently employed at the Primary level in Guyana. <https://www.worldbank.org/en/topic/education/brief/teach-helping-countries-track-and-improve-teaching-quality>



to the other, and the training provided to teachers at the primary level will be consistent with the training provided in this subcomponent. The subcomponent would finance training activities, including consultants, master trainers and logistical support as needed.

21. Subcomponent 1.2: Learning materials (US\$0.5 million). To support the rollout of the curriculum at the early childhood level, this subcomponent would finance accompanying learning materials for all children at the Nursery level 1 and 2 in Regions 1, 7, 8, 9.²³ The subcomponent would finance the acquisition and adaptation of learning materials for age-appropriate play-based learning. Should schools remain closed due to the pandemic, materials will be delivered to the homes of students to support parental instruction and distance learning provided by television/radio and online formats (delivered by the MOE).

22. Subcomponent 1.3. Primary caregiver education (US\$0.3 million). This subcomponent would support the provision of primary caregiver education through 10 “parenting circles” in Regions 1 and 7, building on a previous pilot.²⁴ The parenting circles will provide a training program that will be designed and implemented to strengthen parenting awareness, knowledge, and skills in support of children’s emerging literacy and numeracy. This activity complements the materials being provided under subcomponent 1.2, as well as home-based learning kits provided under a separate activity.²⁵ Caregiver engagement is key to ensuring that children’s learning is secured in the medium and long term, in connection with or in lieu of access to regular schooling. The activity can also reach an additional target group of younger children prior to enrollment in nursery. Parental engagement can take various formats, through in-person meetings should the context allows it, or through print media, telephone, radio or digital formats. A communication campaign targeted to caregivers will be conducted, including print materials, TV and radio spots.²⁶ The subcomponent would finance provision of training and associated logistical costs.

23. Component 2: Promoting Technology-Assisted Learning at the Primary level (US\$2.5 million). This component aims to increase use of technology at the primary level to supplement teaching and support student learning in foundational skills in mathematics and literacy. This component has two subcomponents: implementation of tablet programs and smart classrooms.

24. Subcomponent 2.1: Tablets to support mathematics and literacy (US\$2.4 million). This subcomponent would support technology-assisted learning in mathematics and literacy, as critical foundational skills, through the use of tablets in Grade 4.²⁷ Tablets equipped with learning software will be provided to primary students in Grade 4. A consultancy would be undertaken to review the Guyanese

²³ The targeted regions 1, 7, 8 and 9 are those regions with lowest education and other social outcomes overall, referred to as the hinterland regions in Guyana.

²⁴ Parenting circles were supported by the Ministry of Education through the Guyana Early Childhood Education Project (P129555, TF019053)

²⁵ Through the Early Learning Partnership, the Bank is supporting the production of interactive lessons to be aired on radio and television to support learning continuity; the provision of resources to support home based learning; and the development of a tool to assess learning losses when learners return to school, to allow for targeted interventions.

²⁶ The communication campaign “Read, Play, Love” was developed under GECEP project, and will be updated to ensure continued relevance (i.e. featuring up-to-date and culturally relevant role models)

²⁷ Grade 4 is targeted to give time to allow preparation of students before Grade 6, which is an important year in the Guyanese education system, as the National Grade Six Exam will determine which secondary school a child will be able to attend. In the future, the Government will seek to finance tablets at grade 5 and 6 level as well.



curriculum²⁸ and adapt the software as needed. Master trainers will be trained, who will in turn train Mathematics/Language teachers in each selected school in the use of the tablets and software. The teacher training will include pedagogical and technical skills to support teaching and learning as part of their daily classes (synchronous instruction), as well as provide self-paced options for students (asynchronous). Additionally, the teacher training will include gender-informed motivational strategies for increasing participation of both girls and boys. Teachers will also be trained to identify and report maintenance issues through established channels in their region, which will be reviewed in follow-up visits. In addition, a hotline has been established by the MOE, which teachers can access to report issues and ask questions. The training will be followed up by classroom visits to provide hands-on coaching for teachers to use the tools with students once school resumes (or digitally through an online training platform). The design will be adapted to the current context as needed, by providing tablets to students in the classroom or to use at home, exclusively or as part of a hybrid distance/in-person model. Finally, simple instructions will be provided to caregivers to accompany any device brought home.

25. The intervention under subcomponent 2.1 is timely given the context of the COVID-19 pandemic. The Project will take advantage of the Government's initiative of bringing internet connectivity to remote communities to ensure the inclusion of the most vulnerable students. The tablet software will also include offline capabilities to ensure usage in areas with low connectivity. This will support continuity of learning whilst out of school and assist with learning recovery when classes resume. Returning students may have a wide variation of ability level, and the tablets will allow students to self-pace as part of class as well as at home. The tablets will also support the teacher to teach to the right level, allowing them to focus attention on a particular group of students whilst others use the tablets at their own level. Differentiated instruction can increase engagement, avoiding students losing interest if the lesson is too slow, or discouraged if the lesson is too fast. Furthermore, adaptive technology enhances this impact by using individual learners' data to create a personalized path through educational content. As self-paced learning has larger benefits for students who are behind, the use of tablets can promote equity. To monitor progress in closing achievement gaps, the project will perform pre- and post-tests as part of the tablet program and disaggregate the results by gender. Schools will be selected based on specific criteria, including connectivity, presence of ICT personnel and interest of head teachers, as well as need to ensure that vulnerable students benefit. Need will be determined by test scores, specifically school performance on the National Grade Six Exam in mathematics (at least 30 percent of participating schools would have around 30 percent pass rates). The schools chosen will overlap with those rolling out EMIS in the first year of implementation, to ensure efficiencies of implementation. The targeting will be communicated clearly to affected and neighboring communities and other education stakeholders to ensure transparency. The subcomponent would finance consultancies, provision of hardware, software, and training.

26. Subcomponent 2.2: Smart classrooms to support learning (US\$0.1 million). This subcomponent would support technology-assisted learning through equipping 10 selected Grade 4 classrooms as Smart Classrooms to be part of a pilot, including smartboards, tablets, and projectors, in both urban and rural areas. Teachers will be trained to utilize the equipment as a supplement to their daily teaching and to provide self-guided options for students. Smart classrooms can bring academic concepts to life through visual and practical learning experiences, helping students to understand how schooling applies to the real-world. It also makes differentiated learning easier as teachers are able to accommodate different

²⁸ Using the new curriculum, which is currently being updated, supported by the ongoing Guyana Education Sector Improvement Project (GESIP, P159519).



learning styles: e.g. visual learners are able to observe the whiteboard, while tactile learners can learn by touching the board. In addition, the smart classrooms would enable long-term remote learning by connecting better-performing, centrally located teachers to classrooms in remote schools (“twinning”), whereby the central teacher can lead a class whilst the local teacher facilitates the lesson. Schools will be selected amongst those participating in the tablet pilot, based on similar criteria. These criteria include connectivity, presence of information technology personnel and interest of head teachers, as well as need, to ensure that vulnerable students benefit. Need will be determined by test scores, specifically performance of the school in National Grade Six Exam math scores (at least 30 percent of participating schools would have around 30 percent pass rate). The targeting approach will be communicated clearly to affected and neighboring communities and other education stakeholders to ensure transparency. The smart classrooms will play a key role as they can be used to support a hybrid distance/in-person model by linking classrooms to students at home (in areas of connectivity). In this manner, the smart classrooms will provide learning continuity as well as improved learning once school resumes. To accompany this initiative, the Project will also develop a community of practice of teachers by establishing communication channels through social media as well as group meetings to discuss progress and challenges, and facilitate peer learning. Lessons learned could inform future interventions at scale. The subcomponent would finance provision of hardware, software, and training.

27. Component 3: Strengthening Institutional Capacity and Project Management (US\$1.9 million).

The aim of this component is to support the management of the education system through better data and support Project management.

28. Subcomponent 3.1: Support to national EMIS (US\$1.4 million). This subcomponent seeks to strengthen the management of the sector by supporting the further development and roll out of an integrated EMIS at the national level in the nursery, primary and secondary sectors. This would enable the MOE to efficiently manage education sector data and use information for effective planning and policymaking, and allow principals to make informed decisions at the school level. The subcomponent would fund a consultancy to design a reference architecture and assess all system data needs. The Project will also support investment in software, including configuration of any additional modules, support to integrating EMIS with learning platforms and other transactional systems, and incorporate reporting tools, allowing aggregation, analysis, and the development of comprehensive dashboards. These can be used, amongst other things, as part of an early warning system for the prevention of school failure, repetition and early drop out of students, which is a particularly important risk in the context of COVID-19. The Government aims to expand the EMIS to schools across all pre-tertiary levels in the country (nursery, primary and secondary, total of 1000 schools); the Project will focus on support to primary and secondary schools (total of 574 schools). The Project would finance procurement of EMIS hardware, including tablets to be provided to schools lacking in computers to allow data uploading by teachers and administrators at the primary and secondary level.

29. Subcomponent 3.1 would also provide training for school administrators, teachers at the primary and secondary level, Regional Education Officers and the central MOE Planning Unit. The training will aim to improve the capacity of system users to digitally upload student data, apply homogeneous and efficient criteria for migration, as well as validate and ensure consistency of data. The training would also focus on strengthening the capacity to transform available data in the different platforms and information systems into information for monitoring, evaluation and decision-making at



the school, regional and central levels. Due to the limitations of internet connectivity in some schools and associated challenges, data collection would be possible offline, and data can be synced periodically once users can access an area with internet. A feasibility study will be conducted prior to activity implementation.²⁹ Maintenance would follow existing channels, with schools to report any issues to the regional offices. The subcomponent will finance training, tablets, software, and consulting services. The expected results of the intervention are that teachers and administrators at targeted schools are able to enter data on a regular basis, that the collected data is visualized through a harmonized dashboard, and that statistical reports are used to improve education planning.

30. Subcomponent 3.2: Project management, monitoring and evaluation (US\$0.5 million). This subcomponent would finance project management, monitoring and evaluation, as well as auditing activities.

31. The Project considers climate change in its design. Considering Guyana's low-lying coastline and anticipated climate change impacts, sea level rise may lead to inundation of coastal areas, saline intrusion into surface and ground water sources, and overtopping of existing sea defenses. An increase in extreme precipitation and an increase in the number of extreme rainfall events due to the effects of climate change may also increase flood risk in the future. The Project would consider observed and anticipated climate change impacts and associated vulnerability of Guyana's education system and its population. Under this Project, the introduction of smart classrooms and tablet interventions represents a move away from reliance on print materials and texts. Where print materials are necessary in order to reach vulnerable populations, technology such as QR codes will be used to allow access to additional materials electronically. These measures are complementary to the ongoing GESIP Project, which incorporates climate change considerations in its revised curriculum across all grade levels, as well as in training on the curriculum for the teachers.

32. The Project will also support help close gender gaps in learning outcomes. Student achievement in mathematics show girls outperforming boys in the Grade 6 national exams (44 percent versus 37 percent, respectively, in 2019). The teacher training will include gender-informed motivational and engagement strategies for increasing participation and performance of boys in mathematics, such as using applied concepts. This works in hand with overall teacher training on the curricula under GESIP, which trains teachers to address biased attitudes against boys and help them accommodate different learning styles. In addition, the use of technology such as tablets is designed to allow the boys to catch up, as self-paced learning has bigger benefits for students who start farther behind. To monitor progress in closing achievement gaps, the Project will perform a pre- and post-test in mathematics as part of the tablet program and disaggregate the results by gender, and aims to narrow the gap.

33. An overarching policy of the Government, as stated in the ESP 2021-2025, is to cater for students with disabilities in mainstream schools. All training under the Project will include sensitization to students with disabilities. This will be in complement to the ongoing GESIP, which incorporates disability sensitivity training into teacher training for all school levels. The tablets procured under the Project will have capacity for closed caption/narration to accommodate students, and teachers would be instructed on how to assist

²⁹ The feasibility study will include an initial checklist to be implemented prior to the final design of the activity. This checklist is structured around 9 main pillars: Digital Readiness; Architecture Overview; Business Objectives; Data; Application; Technology; Cybersecurity; and Procurement. It is planned for July-August 2021.



students in utilizing these features. Before implementation, the National Commission on Disability will be consulted to ensure they are informed of the Project and their feedback will be incorporated into implementation, as appropriate.

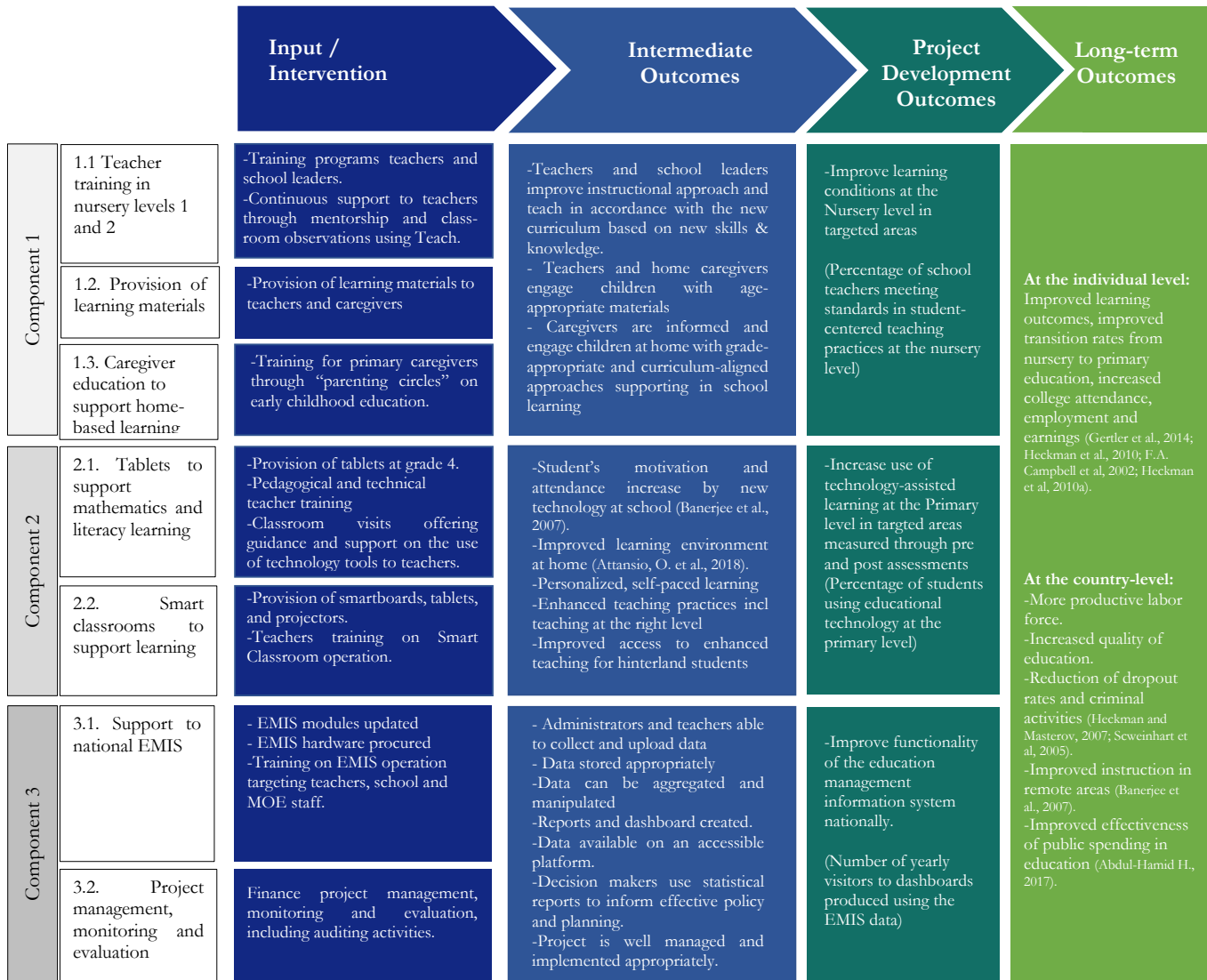
34. The Project employs citizen engagement in its design. Before implementation, consultations of all key groups will take place, including involving teachers in the design of the teacher training to improve the program and increase buy-in. In addition, during implementation, the Project Implementation Unit (PIU) will undertake four different surveys of participant satisfaction, included in the Results Framework as an intermediate result indicator to ensure citizen engagement, input and feedback loops to improve the Project outcomes.

C. Project Beneficiaries

35. The main beneficiaries of the Project would be the students of nursery, primary, and secondary schools in Guyana. The direct beneficiaries of the first component would be the nursery teachers, students, and parents that receive teacher training, learning materials, and caregiver education. Through its focus on teaching methods targeted to children's individual learning levels, as well as focus on the hinterland, the Project is expected to benefit traditionally disadvantaged students along dimensions of gender, disability, ethnicity and geography. The direct beneficiaries of the second component would be the Grade 4 students who benefit from the tablet and smart classroom initiatives, as well as their teachers, the IT personnel and the school administrators who will be trained through the program. The component will be targeted to ensure beneficiaries include vulnerable populations, through offline ability of tablets and twinning of urban and rural schools. The direct beneficiaries of the third component would be the teachers, principals, and the MOE, including at the central Planning unit as well as the Regional Education Officers, who will be trained and have access to better education data to inform their work. Finally, in the long term, the productive sector, employers, and the general public would all benefit from the activities of the Project.



D. Results Chain



E. Rationale for Bank Involvement and Role of Partners

36. Education is widely recognized as a public good and a right, which means its availability and quality should be guaranteed by the state. Education is an important part of human capital accumulation and it contributes to productivity, economic growth and poverty reduction. Research suggests that long-term economic growth is closely related to the level of cognitive skills of the population.³⁰ Education can

³⁰Hanushek, Eric A.; Woessmann, Ludger. 2007. The Role of Education Quality for Economic Growth. Policy Research Working Paper; No. 4122. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/7154>



also improve health, reduce crime and at-risk behaviors, facilitate civic participation, and yield inter-generational benefits. In the context of Guyana, where education is predominately provided by the public sector, government intervention is an effective way to realize these benefits. This is particularly true for the specific activities under this Project. The nursery level is critical to set up students for a lifetime of learning and can be underinvested in by parents, in particular in underserved areas. Education technology allows the Government to pilot innovations that have the power to transform its education system and improve equity. The EMIS is a critical tool to manage the education system as a whole, uniquely useful from the Government vantage point of the education system. Together, these interventions support students at critical junctures on their path through education and sets them up for success as productive citizens in the future.

37. The World Bank has extensive experience supporting the education sector in Guyana, in coordination with development partners. The Bank has expertise across all levels of the education sector, including early childhood, education technology, and EMIS, and can draw expertise from a vast global knowledge depository. Furthermore, the Project builds on and complements other Bank-financed projects at the country level, including the previous Guyana Early Childhood Education Project (GECEP, P129555, TF019053), the ongoing Secondary Education Improvement Project (P147924, IDA Credit No. 5473-GY), and the ongoing Guyana Education Sector Improvement Project (P159519, IDA Credit No. 6009-GY). The proposed Project would be financed by the Global Partnership for Education (GPE), which is a major partner of the Government in the education and health sector. Other partners active in these sectors in Guyana include UNICEF and the Inter-American Development Bank (IADB). Currently, UNICEF is executing a GPE COVID-19 Accelerated Funding (US\$3.75 million) supporting continuity of learning, wellbeing/psychosocial support, and Water, Sanitation and Hygiene (WASH) and safe school activities. The MOE is following a hybrid approach with both online and offline platforms, as well as print based materials and manipulatives, targeting the most marginalized populations in the hinterland, riverine areas, including children with disabilities. The IADB currently has an ongoing project, Support to Safety Nets for Vulnerable Populations Affected by Coronavirus in Guyana (US\$15 million), focusing on vulnerable and indigenous populations with two components: one focused on social services (cash transfers) and one for education (educational materials for radio, tv, and print), provision of access to water, and support for student loan payments (higher education). The Bank is in communication with both partners to ensure complementarity and efficiency.

38. As a GPE-funded operation, the Project will follow the GPE guidelines for education stakeholder coordination, and its recommended country-level process for Project preparation and supervision. Guyana's Local Education Group (LEG), which includes domestic as well as international partners, has played a key role in the development of the Project and will participate in its implementation monitoring. UNICEF, as the in-country Coordinating Agency (CA) designated by the LEG, has coordinated sector development partner involvement in Project preparation, serves as the communication focal point between the LEG and the GPE Secretariat, and will support the high-level monitoring of the Project. The World Bank, selected as the Grant Agent for the Project, will support the MOE in the development, implementation and monitoring of the Project, providing fiduciary and technical oversight and support



throughout the life of the Project. The LEG will be kept informed and consulted on the Project implementation status throughout the process, including through established quarterly meetings.

F. Lessons Learned and Reflected in the Project Design

39. The Project considers several lessons from previous projects, including from the GECEP (funded by GPE), which included teacher training and caregiver education. For teacher training, one key lesson learnt during the GECEP project was to ensure that training is not a one-off event, but rather that teachers are trained and supported in the field over a longer time period. It is critical to provide multiple follow-up visits to provide on-going coaching and mentoring to the teachers in their classrooms, which is reflected in this Project design. The GECEP project also provided lessons with regards to the caregiver education. One key lesson was to ensure that the facilitators leading the Parent Circles were recruited locally, to ensure they knew the context and would more likely be respected by the community. Another was to consider the logistical aspects of training. This included scheduling training at a convenient time and place, informed by the participants, and providing or subsidizing transportation, to ensure caregivers would be able to participate. Feedback and flexibility were key to optimize learning for the participants, and are incorporated into the design of this Project.

40. The Project design also draws lessons from GSEIP, which included a technology-assisted learning pilot using tablets for mathematics. A comprehensive review of the pilot provided several lessons, in terms of hardware, infrastructure, maintenance and training. First of all, the technology is necessary, but not a sufficient condition for success. It is important to get the correct specification for the procurement of the hardware to avoid excessive maintenance needs. However, digital learning is not only about technology, it is about changing behavior. Using technology for learning requires a comprehensive system approach, with (i) clear strategy and strong leadership; (ii) efficient institutional set-up with capacities to plan, coordinate, assess, detect and address problems early; (iii) adapted curriculum and pedagogy before deciding on equipment; (iv) teacher, headmaster and inspector training, coaching and support; (v) stakeholders engagement (such as teachers union, community groups, private sector); (vi) sufficient material resources (one device per learner and teacher); (vii) support structure through hardware deployment (maintenance system, help desk; and (viii) monitoring and evaluation. An approach that focuses on the teachers can be helpful: (i) digital learning must decrease and not add to the teachers' workload; (ii) efforts need to be made to include teachers in the production of content; and (iii) emphasis and financial resources could be allocated to teacher training, coaching and support, both in terms of pedagogy and technology. Finally, the strategy adopted should be aligned with the environment. In particular, the design should consider the connectivity and maintenance challenges before deciding on the type of strategy and implementation (including equipment). The Project design has taken these elements into consideration, following a comprehensive system approach including ensuring an appropriate environment for information technology, channels for maintenance, and providing adequate training, led by the National Center for Educational Resource Development (NCERD), the institute responsible for all training, so that it is sufficiently integrated into teacher training, and supporting teacher follow up and mentoring. The intervention will also include feedback loops to continuously improve implementation, student usage and ultimately, learning outcomes.

41. The Project design also draws lessons from the EMIS components of GSEIP, which piloted EMIS at the secondary school level. An EMIS system, called OpenSIS, was piloted and is still being used at the



secondary school level to record their student, classes, staff, attendance and assessment data. However, OpenSIS has limited capability in terms of statistical reporting at an aggregate level. The main lesson from the pilot is that a unified comprehensive system for the entire sector needs to be developed that allows all data to be managed in one platform. A thorough analysis is being carried out to establish the needs, strengths, and possible bottlenecks. An efficient platform should be put in place, and resources allocated to data collection, reporting and data analysis training, at all levels, as well as software training. The Project will support the development of an EMIS system, which allows a full education sector approach, and will include statistical reporting capabilities. OpenSIS will be subsumed by the new national EMIS.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

42. The MOE will be the implementing agency for the Project. The MOE has extensive experience successfully implementing Bank-financed projects. Technical responsibilities for implementation overall would lie with the Chief Education Officer of the MOE. For Components 1 and 2, technical responsibility for implementation would lie with the Assistant CEO for Nursery and the Assistant CEO for Primary, respectively. The NCERD will lead on training aspects. For Component 3, technical responsibility would reside with the Statistics and Monitoring section of the Planning Unit. Fiduciary responsibilities would be managed by the Planning Unit of the MOE, which currently handles all financial management and procurement for the ongoing Bank Projects in Guyana.

43. The Project would be managed by a PIU housed in the MOE Planning Department. The PIU would consist of a Project Coordinator, a Procurement Officer, a Financial Officer, a Finance assistant, a Monitoring and Evaluation Officer, an Environmental Officer (part time) and a Social Development Officer (full or part time, as needed throughout implementation). The Project Coordinator would be a dedicated resource, whilst the other human resources may be shared across existing projects, in order to benefit from existing skills and to increase efficiency of overall portfolio supervision. The PIU would be responsible for day-to-day management, monitoring, and coordination of implementation, including work planning, procurement, accounting, disbursement, financial management, and other Project-related activities. The Project Coordinator would report to the Chief Planning Officer of the MOE, supervise agreed work plans for each component, and coordinate implementation among MOE departments. In addition, the Project Coordinator would be responsible for reporting to the Bank through the Quarterly Progress Reports. These arrangements are the same as for all other ongoing Bank-supported Education projects in the portfolio in Guyana

B. Results Monitoring and Evaluation Arrangements

44. The MOE would be responsible for the Monitoring and Evaluation (M&E) process of the Project, supported by the M&E Officer within the PIU. The Project Coordinator would send semiannual and annual Progress Reports to the Bank, including on progress toward targets described in the Results Framework prepared by the M&E Officer. The measurement and evaluation capacity would be strengthened through training as necessary. M&E officer will collect data on the activities in accordance with the results framework, including the three PDO indicators as well as all intermediate indicators. The



M&E officer will also monitor beneficiary feedback. This includes administration of surveys to collect information from both teachers and parents at the nursery level, from teachers and students in the EdTech program at the primary level, and the teachers, principals, and administrative personnel for the EMIS activity. In particular, in relation to the EdTech programs, light-touch evaluations will be conducted throughout the activity to understand behavior changes, consisting of questions as part of the survey, as well as periodic interviews with beneficiaries. Feedback received will be incorporated into the programs as appropriate during project implementation.

C. Sustainability

45. The sustainability of the Project results lies in its close linkage with Government priorities as identified in the ESP 2021-2025, alignment with other projects, and focus on capacity-building. All components are designed to support the Government's plans to improve learning outcomes by improving readiness of nursery level students, education technology at primary level, and supporting management of the education system as a whole. The Project is designed to fit with all existing and upcoming projects, including those financed by different development partners. The Project is widely supported by all stakeholders, who have been consulted and contributed to the process through the LEG, and will continue to support the project as needed throughout implementation. The Project is also designed to build capacity, and is implemented through the Government's agencies, so that the Government is equipped to continue improving learning outcomes after the Project closes. This is the case at the central level, working through the various MOE agencies, as well as at the regional level, as the Project utilizes existing channels. The Project also provides opportunity for trainings to build capacity, such as in procurement and financial management, as well technical assistance in technical areas such as EMIS and EdTech.

46. The estimated cost of this Project is US\$6.7 million over a 3-year period, and the recurrent costs will be absorbed by the Government after the project closes. The total cost of ESP 2021-2025 for the education sector over the five-year period is about US\$1,633 million,³¹ including only the Government financing for education. Total expenditure for the sector as a percent of GDP is projected to increase, from 5.6 percent in 2018 to 5.9 percent in 2025.³² The projected increase in the education budget incorporates the continued financing of the interventions in the Project including expanding the EMIS, maintaining smart classrooms and tablets, and continued teacher professional development programs after the Project concludes. The Government has indicated continued commitment to the Education sector.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

47. The interventions proposed are technically sound, supported by evidence, and expected to have high returns in: (i) improved learning conditions for nursery students; (ii) improved use of Education Technology for primary school students; and (iii) improved transparency, accountability and management of the Education system through an EMIS.

³¹ Estimated using cost figures from the ESP 2021- 2025 (exchange rate December 31, 2020)

³² ESP 2021-2025



48. Improved School Readiness for Nursery students: International research suggests that promoting early stimulation is likely to yield high returns in Guyana. Without receiving adequate stimulation in early childhood, children may enter school ill-prepared and will be more likely to have poor academic performance, to repeat grades, and to drop out of school compared to children whose cognitive skills and overall school readiness are higher upon primary school entry (Heckman and Masterov, 2007³³; Reynolds et al, 2001³⁴; Feinstein, 2003³⁵; Pianta and McCoy, 1997; Currie and Thomas, 1999). Investments in Early Childhood Development have been linked to lifelong benefits for participants and society in general, including increased wage-earning potential, decreased incarceration, and lower reliance on social welfare (Hoddinott et al, 2008; Stein et al, 2008; Schweinhart et al, 2005). Ample international evidence³⁶ has shown that gaps in knowledge and ability between disadvantaged children and their more advantaged peers open early, tend to persist throughout life, and are difficult and costly for countries to close. Improvements in the quality of the early education offered to nursery students in the hinterland would foster positive outcomes, including building valuable skills and boosting the earning potential of these students, and ultimately strengthening Guyana’s workforce and helping to grow its economy.

49. EdTech in Primary: Digital learning can reach marginalized learners, lower costs, enhance teaching, and offer flexible ways to acquire skills.³⁷ Although still understudied, a systematic review of literature suggests that computer-assisted learning holds promise to improve learning outcomes.³⁸ In the United States, for instance, an online program that provides students with immediate feedback on math homework for less than 30-40 minutes per week had an effect size of 0.18 standard deviations, and a software-based math curriculum intervention significantly increased seventh and eighth grade math scores by 0.63 and 0.56 standard deviations, respectively.³⁹ In India, adaptive learning software also led to positive impact on mathematics and Hindi.⁴⁰ A randomized controlled trial on the impacts of the program in Brazilian public primary schools found positive effects of the program on measures of attitudes towards math, which were not translated into a positive average treatment effect on students’ math proficiency due to infrastructure challenges.⁴¹ Another impact evaluation in Sri Lanka found that Khan Academy tutorials improved test scores in Mathematics among ninth grade students in Sinhala-medium public schools.⁴² In Chile, researchers found that the program changed the ways in which students engaged with and were engaged by Math content, and also changed the interaction between teachers

³³ Heckman, J. J., & Masterov, D. V. (2007). The productivity argument for investing in young children. *Applied Economic Perspectives and Policy*, 29(3), 446-493.

³⁴ Reynolds, A. J., Temple, J. A., Robertson, D. L., & Mann, E. A. (2001). Long-term effects of an early childhood intervention on educational achievement and juvenile arrest: A 15-year follow-up of low-income children in public schools. *Jama*, 285(18), 2339-2346.

³⁵ Feinstein, L. (2003). Inequality in the early cognitive development of British children in the 1970 cohort. *Economica*, 70(277), 73-97.

³⁶ Examples include: James J. Heckman, *Early Childhood Education* (2016); Isabel V. Sawhill, Jeffrey Tebbs, William T. Dickens, *The Effects of Investing in Early Education on Economic Growth* (2006); OECD, *Investing in High Quality Early Childhood Education and Care* (2012).

³⁷ Education Commission 2016.

³⁸ Escueta et al. 2017.

³⁹ Roschelle et al. 2016; Roschelle et al. 2010.

⁴⁰ Muralidharan et al. 2019.

⁴¹ <https://mpra.ub.uni-muenchen.de/94736/>

⁴² <https://eric.ed.gov/?id=EJ1201489>



and students.⁴³ In another study, results show that children exposed to the web-based program intended to increase the vocabulary of preschool and primary school children scored higher than children assigned to control group (+0.23 standard deviations).⁴⁴ In addition to supporting Guyanese students' attainment in mathematics and literacy, and inform the future rollout of technology initiatives in the education system, the Project will serve to generate evidence and contribute to research in the area.

50. EMIS: A successful EMIS⁴⁵ can inform policy, support education planning and improve monitoring of education systems.^{46,47} The EMIS can contribute to a more efficient and higher performing education system that will ensure better educational outcomes, and subsequently bring economic benefits. Accurate and timely data is critical for informed decision-making and management and to ensure that resources and time are placed where they are most needed. Moreover, the EMIS can foster transparency and accountability, and in turn promote equity. It can promote dialogue by providing quality data and knowledge to a broader community (schools, teachers and parents, researchers, non-governmental organizations, multilateral organizations). An EMIS can also be used as an early warning system to help schools identify and assist at-risk students to prevent dropout.

51. The project is expected to yield high returns. Improving nursery school readiness (component 1) as well as providing EdTech solutions to primary schools (component 2) are expected to increase education quality and enhance student's learning outcomes. In the long run, these interventions are assumed to increase educational attainment and adulthood earnings. More precisely, the project's beneficiaries will benefit from an annual increase of 4 percent in earnings over their active lifetime (estimated to last 30 years). The project NPV is estimated at US\$18.5 million. The IRR is expected to be higher than the discount rate (10 percent against 5 percent), which suggests that the project is a worthwhile investment. Furthermore, the economic benefits of component 3 were not considered given the difficulty of monetizing this intervention's impact, but as explained previously the benefits of the EMIS are expected to be large. As such, this is a lower bound, and true economic benefits may in fact be higher as they would include other potential benefits from this component.

B. Fiduciary

(i) Financial Management

52. The Project's financial management (FM) would be handled by a PIU under the Planning Unit of the MOE. The PIU will share resources with the existing projects, which includes a Finance Officer and a Finance Assistant, both with degrees in Accounting and extensive experience with Bank Projects. They have been satisfactorily managing the FM aspects of the ongoing projects. The agreed FM arrangements

⁴³ <https://www.learntechlib.org/p/147457/>

⁴⁴ Kalil, A., Mayer, S., & Oreopoulos, P. (2020). Closing the Word Gap with Big Word Club: Evaluating the Impact of a Tech-Based Early Childhood Vocabulary Program.

⁴⁵ EMIS Definition: Data system that collects, monitors, manages, analyses, and disseminates information about education inputs, processes, and outcomes—in particular, student learning. Abdul-Hamid, H. (2017). Value of Data: Better Data, Better Education.

⁴⁶ Zhang, L., Zhang, M., & Pan, X. (2018, June). Strategies for the Improvement of Quality of China's Basic Education. In 2018 2nd International Conference on Management, Education and Social Science (ICMESS 2018). Atlantis Press

⁴⁷ Makwati, G., Audinos, B., & Lairez, T. (2003, December). The role of statistics in improving the quality of basic education in Sub-Saharan Africa. In *ADEA Biennial Meeting* (pp. 3-6)



for the ongoing projects will continue to be applied to this project. These are further elaborated under the implementation arrangements (Annex 1). A FM section reflecting the agreed FM arrangements will also be included in the Project Operational Manual. The project will submit interim financial reports every six months, within 45 days of close of the six-month period. An annual audit will be conducted by the Auditor General of Guyana and a copy of the report along with management letter will be submitted to the Bank within six months of the close of the financial year.

(ii) Procurement

53. Procurement will be carried out in accordance with the World Bank’s “Procurement Regulations for Investment Project Financing (IPF) Borrowers” (Procurement Regulations) dated November 2020, with due consideration to “Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants”, dated October 15, 2006, revised January 2011 and as of July 1, 2016. In accordance with paragraph 5.9 of the Procurement Regulations, the Bank’s Systematic Tracking and Exchanges in Procurement (STEP) system will be used to prepare, clear, and update Procurement Plans and monitor all procurement transactions for the Project. A simplified Project Procurement Strategy for Development (PPSD) was prepared to define the applicable procurement arrangements, appropriate selection methods, including market approach, and type of review to be conducted by the World Bank.

54. Procurement would be out carried out by a PIU under the MOE Planning unit, also utilizing the same arrangement and resources as ongoing projects. The PIU includes a Procurement Officer, who was recently promoted from Procurement Assistant, and who has previous experience in World Bank procurement. However, although the arrangement is largely satisfactory, delays in procurement processing and contract management under ongoing projects, particularly related to procurement of works, have raised concerns about the capacity to implement another project. Nonetheless, in particular as this Project does not include any civil works, it has been deemed satisfactory. The proposed mitigation measures included in the PPSD shall be observed to ensure smooth implementation of the Project.

C. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

55. The Project does not trigger any Legal safeguards. By supporting the Project, the Bank does not intend to make any judgment on the legal or other status of the territories concerned or to prejudice the final determination of the parties' claims.

D. Environmental and Social

56. The Environmental and Social Risks Classification (ESRC) for this Project is moderate.



57. The environmental risk is expected to be low. The project does not include any construction activities or procurement of heavy machinery. The anticipated environmental risks and impacts to the project interventions are likely to be negligible. Therefore, consistent with the requirements of ESS1, no further environmental assessment has been determined necessary after the initial screening. However, the e-waste to be generated from the tablet program and smart classroom initiative will be managed through developing and implementing e-waste management guidelines, which will be prepared as a standalone document within 30 days of effectiveness. The e-waste guidelines will also be included in the Project Operational Manual.

58. The social risk is expected to be moderate. The social risks identified at this stage mainly relate to social exclusion risks and exacerbating inequalities between the indigenous and non-indigenous students and caregivers, if the cultural adaptation and specific needs of these groups are not taken into account. The social risk of exclusion and inequality could particularly present itself in: i) inadequate trainings and learning materials impeding students, in particular indigenous students, from Nursery 1 and 2 to fully benefit from the project support; and ii) the risk of having inadequate training impeding the primary caregivers, in particular indigenous caregivers, to fully benefit from the project support. The project activities will only be limited to training, equipment, and consultant services, thus no risks linked to land acquisition, physical and economic displacement are foreseen.

59. The Project shows awareness of this issue and proposes activities tailored to the overall specificities of the regions. An Indigenous Peoples Plan Framework (IPPF) was prepared and disclosed on June 16, 2021, and an Indigenous Peoples Plan (IPP) will be prepared for the development of the training and learning material adaptation to be financed during the project implementation. The scope and scale of both the IPF and IPP will be proportionate to the scope and scale of the potential social risks associated with the project financed activities under Component 1.

60. The MOE has also prepared and disclosed several other documents: a draft Environmental and Social Commitment Plan (ESCP) including a Stakeholder Engagement Plan (SEP) and a Grievance Redress Mechanism (GRM) was disclosed on May 19, 2021,⁴⁸ and a draft Labor Management Procedure (LMP) including a Code of Conduct (CoC), and a dedicated GRM for project workers was disclosed on June 16, 2021. The LMP, SEP and IPPF will be finalized within 30 days of project effectiveness.

61. Six Environmental and Social Standards (ESS) are considered relevant to the proposed operations at this stage. These are: ESS1 Assessment and Management of Environmental and Social Risks and Impacts, ESS2 Labor and Working Conditions, ESS3 Resource Efficiency and Pollution Prevention and Management, ESS4 Community Health and Safety, ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, and ESS10 Stakeholder Engagement and Information Disclosure. The PIU will include an Environment Officer (part-time for e-waste management) and an experienced Social Development Officer (part time, as needed).

V. GRIEVANCE REDRESS SERVICES

⁴⁸ Following ESS10 footnote 3, which states that “depending on the nature of the scale of the risks and impacts of the project, the elements of a SEP may be included as part of the ESCP and preparation of a standalone SEP may not be necessary.”



62. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VI. KEY RISKS

63. The overall risk of the Project is Moderate. The risk rating is driven by moderate risks related to technical design, institutional capacity for implementation, fiduciary issues, and social risks. With regards to technical design, there are several risks related to the technology-assisted learning activity, which remains a fairly new area in the school system in Guyana. The tablet and smart classroom programs could be affected by problems with schools' connectivity, hardware breaking, or inadequate implementation of the training. In addition, there are risks around safeguarding of information, given technology is being used to collect sensitive data, including on teacher and students. To mitigate this risk, the Project will select schools based on criteria that include connectivity, presence of IT staff, and expressed interest of the schools to ensure take-up. Hardware will be procured to high level specifications to avoid additional breakage. Furthermore, the training will include follow-up visits in the classroom to provide hands-on coaching for the teachers, in line with best practice. During visits, the monitoring will also carry out inventory checks and provide any maintenance. These risks are exacerbated in the current context of COVID-19, where the tablets may need to be taken home by students. To manage this, teachers will be trained to detect and report issues along established lines in the region and a hotline will be established to answer questions on the tablets directly. In addition, secure cloud services will be used to store data to safeguard privacy.

64. There is some risk related to institutional capacity for implementation, as the MOE currently has a high volume of projects to implement relative to available capacity. Implementation will be especially challenging for activities in remote rural areas, which are more difficult and time-consuming. To mitigate this risk and prevent delays, the Bank will support the Government in appropriate recruiting of the PIU and will build in additional time for remote activities. There is some fiduciary risk related to procurement, as there is limited capacity for persons with adequate Bank experience in the country, and those existing are currently engaged in ongoing Bank projects. To manage this, the Project will use existing Procurement personnel to provide support to the Project (for which there is precedent), and will provide close additional support as needed. Finally, there are social risks linked to the potential for exclusion of vulnerable people due to inefficiencies in the outreach strategies that may cause inequitable distribution of Project benefits. To mitigate these risks, the Project will support participatory approaches to strengthen Borrower social communication processes, and citizen engagement and beneficiary feedback mechanisms, to ensure inclusion and active participation of beneficiaries from vulnerable groups.



VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Guyana

Guyana Education Sector Program Project

Project Development Objectives(s)

The objective of the Project is to: (i) improve learning conditions at the nursery level in select areas; (ii) increase use of technology-assisted learning at the primary level in select areas, and (iii) improve functionality of the education management information system nationally.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1	2	
Improve learning conditions at the nursery level					
Percentage of school teachers meeting standards in student-centered teaching practices at the nursery level (Percentage)		0.00	2.00	10.00	20.00
Increase use of technology-assisted learning at the primary level					
Percentage of students using educational technology at the primary level (Percentage)		0.00	20.00	40.00	60.00
Improve functionality of education management system nationally.					
Number of visitors to EMIS monitoring dashboard (Number)		0.00	100.00	200.00	300.00



Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1	2	
Improving Learning Conditions at the Nursery level					
Number of teachers trained at nursery level (Number)		0.00	1,000.00	1,500.00	2,200.00
Number of students at nursery level in Region 1, 7, 8 and 9 that have received learning material (Number)		0.00	1,000.00	3,000.00	5,000.00
Number of caregivers trained in Regions 1 and 7 (Number)		0.00	60.00	100.00	150.00
Promoting Technology-Assisted Learning at the Primary level					
Number of students at primary level provided with tablets equipped with learning software (Number)		0.00	2,000.00	4,000.00	7,250.00
Number of teachers trained in use of tablets (Number)		0.00	100.00	200.00	300.00
Number of smart classrooms to support learning established (Number)		0.00	5.00	7.00	10.00
Number of teachers trained in use of smart classrooms (Number)		0.00	10.00	20.00	30.00
Strengthening Institutional Capacity and Project Management					
Number of schools that can upload data into EMIS (Number)		0.00	120.00	300.00	574.00
Statistical Report on primary and secondary level data produced using the EMIS data. (Number)		0.00	1.00	2.00	3.00
Gender parity index in math scores in the technology-assisted pilot schools (percentage points) (Text)		0.00	-1.00	-2.00	-2.00
Students benefiting from direct		0.00	3,000.00	7,000.00	12,250.00



Indicator Name	PBC	Baseline	Intermediate Targets		End Target
			1	2	
interventions to enhance learning (CRI, Number)					
Students benefiting from direct interventions to enhance learning - Female (CRI, Number)	0.00		1,500.00	3,500.00	6,125.00
Survey of participant satisfaction administered, and feedback addressed (Yes/No)	No		Yes	Yes	Yes
Direct beneficiaries (Number)	0.00		4,100.00	8,700.00	14,750.00
Direct female beneficiaries (Percentage)	0.00		50.00	50.00	50.00

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Percentage of school teachers meeting standards in student-centered teaching practices at the nursery level	Percentage of nursery teachers assessed using the Teach instrument that meet the standard. Standard to be determined by MOE informed by the Teach Diagnostic to be conducted in year 1.	Annual	Teach tool	Data collected using the teach tool through classroom observation by trained Teach observers.	PIU/NCERD
Percentage of students using educational technology at the primary level	Percent of students using technology, out of the group provided with tablets,	Annual	Tablets	Data collected automatically through tablet software,	PIU



	defined as a certain number of hours logged on actively on educational software (exact number to be determined in first year of use).			aggregated by PIU.	
Number of visitors to EMIS monitoring dashboard	This entails a functional data collection and storage system, and the design and deployment of useful data visualizations using a business intelligence platform.	Annual	Progress report	Transactional data monitored by data visualizations log	PIU/MOE Planning Unit

Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Number of teachers trained at nursery level	Number of nursery teachers completed a training course and received at least two follow up visits in the new competency framework for preschool teachers that accompanies the new curriculum.	Annual	Progress report	Trainers to record teachers' attendance and completion of training as well as receipt of visits and submit to NCERD/PIU.	NCERD/PIU
Number of students at nursery level in Region 1, 7, 8 and 9 that have received learning material	Learning materials are defined as a package of equipment and material to be provided to nursery students.	Annual	Progress Report	MOE/PIU to track procurement and delivery of learning material kits.	MOE/PIU



Number of caregivers trained in Regions 1 and 7	Number of caregivers that have attended at least 75% of sessions of caregiver training.	Annual	Progress Report	Caregiver education group facilitators to record attendance and record completion of course and submit to PIU.	MOE/PIU
Number of students at primary level provided with tablets equipped with learning software	Tablets equipped with learning software will be delivered to primary level students.	Annual	Progress Report	MOE/PIU to track procurement and delivery of tablets.	MOE/PIU
Number of teachers trained in use of tablets	Teachers trained in both technical and pedagogical aspects of use of tablets, and received at least two follow up visits.	Annual	Progress Report	Trainers to record teachers' attendance and completion of training as well as receipt of visits and submit to NCERD/PIU.	NCERD/PIU
Number of smart classrooms to support learning established	Smart Classrooms mean classrooms provided with digital equipment such as smartboards, tablets, computers, projectors, etc.	Annual	Progress Report	MOE/PIU to track procurement and delivery of smart classroom equipment.	PIU/MOE
Number of teachers trained in use of smart classrooms	Teachers trained in both technical and pedagogical aspects of smart classrooms, and received at least two follow up visits.	Annual	Progress Report	Trainers to record teachers' attendance and completion of training as well as receipt of visits and submit to NCERD/PIU.	
Number of schools that can upload data into EMIS	Number of schools that succesfully record and	Annual	Progress Report	PIU/Planning Unit to report number of	PIU/MOE Planning unit



	upload their school data directly to EMIS. This entails provision of hardware and software and completion of training.			schools inputting data directly into the EMIS.	
Statistical Report on primary and secondary level data produced using the EMIS data.	Statistical Report including nursery, primary and secondary school data produced and published by MOE using the EMIS system	Annual	Statistical Report	Publication of Educational statistical handbook	PIU/MOE Planning Unit
Gender parity index in math scores in the technology-assisted pilot schools (percentage points)	Gender differential in math scores established in pre-test using tablets, compared to differential in post-test.	Annual	Tablets	PIU/MOE to aggregate results recorded by tablets.	PIU/MOE
Students benefiting from direct interventions to enhance learning					
Students benefiting from direct interventions to enhance learning - Female					
Survey of participant satisfaction administered, and feedback addressed	Four surveys will be administered. For C1, two surveys will be administered, one to teachers and one to parents to assess satisfaction with teacher training and caregiver training respectively. For C2, a survey will be administered to teachers to assess tablet/smartclassroom equipment and training. For C3, a survey will be	Annual	Survey	PIU/MOE to administer survey and record feedback provided.	PIU/MOE



	administered to teachers and administrators with regards to EMIS. Feedback from all surveys will be recorded and incorporated in activities as appropriate.				
Direct beneficiaries					
Direct female beneficiaries					



ANNEX 1: Implementation Arrangements and Support Plan

COUNTRY: Guyana Guyana Education Sector Program Project

Financial Management

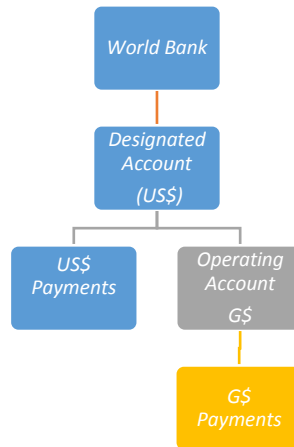
- 1. An FM assessment of the project was conducted** in accordance with the Financial Management Manual for the World Bank IPF Operations (OPCS5.05-DIR.01 issued February 10, 2017). It concluded that the PIU in Ministry of Education (MOE) has a FM system in place, which should be able to provide, with reasonable assurance, accurate and timely information on the status of the funds as required by the World Bank.
- 2. The PIU is already managing two World Bank projects** – P147924 (Guyana Sector Education Project) and P159519 (Guyana Education Sector Improvement Project). These projects have sufficient FM arrangements and are currently running satisfactory for FM. Similar arrangements will be followed for P174244. Agreed financial management procedures for the project are described below.

Financial management and accountability arrangements: planning, budgeting, funds flow, accounting, internal controls, financial reporting and auditing:

- 3. Planning and Budgeting:** A budget and workplan for the life of the project will be prepared by the PIU. It will be revisited periodically and updated as needed to reflect implementation progress. Annual budget of the project will be discussed and agreed with the World Bank. It will be approved and included in the government's estimates of revenue and expenditures and reflected under MOE's allocation.
- 4. Funds Flow:** The project funds will be disbursed through advances to the Designated Account. Direct Payments, Special Commitments and Reimbursement will be permitted. The DA will have a variable ceiling (based on expenditure forecasts for six-month periods), and the minimum value of applications for direct payments will be US\$200,000. Advances will be disbursed by the World Bank to a segregated Designated Account (DA), opened at the Bank of Guyana. DA account will be used to finance U.S. dollar currency expenditures. Funds will be periodically transferred from DA to segregated local currency operating account to finance local currency expenditures. The operating account will also be opened and maintained at the Bank of Guyana.



Figure 1: Funds Flow from World Bank to the DA



5. Accounting and Internal Controls: Project transactions will be accounted and reported on using the cash basis of accounting. PIU currently has QuickBooks (an off the shelf accounting software), which will be used for documenting expenditures for the WB project. A chart of accounts will be designed to capture the transactions by components, subcomponent, and activities. A fixed assets register will be maintained, and annual physical verification of fixed assets will be conducted. The FM tasks and activities will be guided by the financial management manual (FMM), which will include project-specific chart of accounts; and financial management procedures and processes. FMM will cover: (i) roles and responsibilities of the FM staff; (ii) internal controls including procedures to manage and control fixed assets and supplies acquired with loan proceeds; (iii) content and format of the interim Financial Reports (IFRs) and financial statements; and (iv) auditing arrangements. FMM will be an integral part of the Project Operational Manual. It was finalized by project negotiations and reviewed and cleared by the World Bank.

6. Reporting: Advances will be disbursed to the project based on yearly cash forecast and it will be submitting six-monthly unaudited financial reports (called interim financial reports – IFR) within 45 days after the end of each six-month period in the agreed formats. Variance analysis (actual versus budgeted expenditures) would be included in the IFR. The World Bank will document expenditures from the IFRs, which will also include additional request for funds based on the next twelve months cash forecast. The IFRs will contain at least: (i) a statement of sources and uses of funds (with expenditures classified by component) and a cash balance; (ii) a statement of budget execution for each component and subcomponent; (iii) a reconciliation of the Designated Account, and (iv) forecast of expenditure for the next twelve months.

7. External Audit Arrangements: An annual audit of the project financial statements will be conducted by Supreme Audit Institution, i.e., Audit Office of Guyana. The Audit Office, headed by Auditor General, is currently auditing all the World Bank projects in Guyana. The project audit shall be conducted following international standards of Supreme Audit Institutions, on the terms of reference agreed with the World Bank. The audit report, annual financial statements and management letter will be submitted to the World Bank not later than six months after the close of each financial year. Audit report and audited



financial statements will be disclosed on MOE's website, and the World Bank will also make them available to the public in accordance with the World Bank's Policy on Access to Information.

8. FM implementation support will include on-site and off-site supervisions: At project inception training sessions will be provided to project's FM staff on the World Bank FM and disbursements procedures. As circumstances permit, on site missions will be carried out twice a year and calibrated based on assessed risks and project performance. In case of lack of physical access to project facilities once implementation begins, virtual FM implementation support monitoring will be conducted using information technology tools. Off-site implementation support will comprise review of copies of the general ledger and accounts from the accounting software, desk review of Interim Financial Reports (IFRs) and desk review of the audit report presented to the Bank.

9. Conclusions of the financial management risks and agreed mitigation measures: The PIU is already running two World Bank projects satisfactorily. Necessary internal controls were included in the Financial Management Manual and agreed with the World Bank before project negotiations. The FM residual risk rating is assessed as moderate.

10. The overall disbursement arrangements will follow standard disbursement policies and procedures, which will be included in the Disbursement and Financial Information letter. The minimum application size for Direct Payments and Reimbursements will be US\$200,000.

Procurement

11. Procurement will be carried out in accordance with the "World Bank Procurement Regulations for IPF Borrowers" (November 2020) ("Procurement Regulations"). The Procurement Plan, which describes the applicable procurement procedures and standard procurement documents (SPDs) to be used for each procurement method, as well as standard forms of contracts are posted on the World Bank website, will be updated at least annually or as required to reflect the actual Project implementation needs and improvements in institutional capacity. In accordance with paragraph 5.9 of the Procurement Regulations, the Bank's Systematic Tracking and Exchanges in Procurement (STEP) system will be used to prepare, clear and update the Procurement Plans and conduct procurement transactions for the Project. This textual part along with the Procurement Plan tables in STEP constitute the Procurement Plan for the Project. The following applies to all procurement activities in the Procurement Plan:

- (a) The Bank's Standard Procurement Documents shall be used for all contracts. The procurement documents are subject to international competitive procurement and those contracts as specified in the Procurement Plan tables in STEP.
- (b) When approaching the national market, the country's own procurement procedures may be used in accordance to the National Procurement Arrangements of the Procurement Regulations. This would be specified in the Procurement Plan tables in STEP. When the Government uses its own national open competitive procurement arrangements as set forth in the Procurement Act of 2003, such arrangements shall be subject to paragraph 5.4 of the Procurement Regulations and its following



conditions. When other national procurement arrangements other than national open competitive procurement arrangements are applied by the Borrower, such arrangements shall be subject to paragraph 5.5 of the Procurement Regulations.

- (c) Contracts for leased assets, procurement of second hand goods and domestic preference will be bound by the procurement regulations. Procurement regulations would be applicable as specified under paragraph 5.10 for leased assets and paragraph 5.11 of the procurement regulations for procurement of Second Hand Goods. Domestic preference would be specified under paragraph 5.51 of the Procurement Regulations (Goods and Works). Goods are applicable for those contracts identified in the Procurement Plan tables.

Overview of Country, Borrower and Marketplace

12. Client Capability and PIU Assessment:

An assessment of the Project Implementation Unit (PIU) was conducted for the preparation of the Project, the main findings were: Fiduciary responsibilities would be managed by a PIU housed in the Planning Department of the MOE, the Planning Department currently handles all financial management and procurement for the two on-going Bank projects: Secondary Education Improvement and Education Sector Improvement Project. It is important that the procurement team is strengthened with additional staff, namely an experienced Procurement Specialist to be dedicated full time to the Project and ideally a Contract Management Specialist and that all relevant technical teams and evaluators receive procurement training, to ensure better quality of evaluation reports. Two issues that need to be discussed as part of the procurement policy dialogue are: a) the interaction between Guyana's national procurement regulations and the Bank's guidelines; and b) the handling of complaints received in Bank's financed contracts. Although the MoE has previous experience in WB financed projects, several weaknesses and delays in procurement processing and contract management in the Secondary Education Project have raised concerns about the capacity of the MoE to successfully implement WB projects, particularly related to procurement of works. The proposed mitigation measures are included in the PPSD prepared for the Project and shall be observed to ensure smooth implementation of the Project, further, since this Project does not include any civil works, it has been agreed with the team to assign a Moderate Project Procurement Risk.

13. Operational Context:

- (a) *Governance aspects:* The legislation and institutions related to procurement in the country are of recent creation and therefore, the country has overall weak procurement capacity. According to recent reports from Guyana's Auditor General, the Procurement Act of 2003 needs updating, and compliance with all its provisions is needed to ensure transparent, competitive, cost effective procurement. Further, value for money, economy and price variations need to be improved in the country. The WB supports implementing units in the execution of WB funded projects with close supervision, providing training and ongoing procurement support. The Ministry of Education has previous experience in the implementation of WB funded Projects, nevertheless, their success in project implementation seems to vary considerably across PIUs. A key area of weakness seems to be the procurement and management of civil works contracts.



- (b) *Economic Aspects*: Guyana has a small economy and the size of contracts are often small, therefore these do not generate the interest of international firms, especially in the case of civil work's construction and supervision. The country has a limited market, nevertheless vehicles and computers are generally available locally. It is recommended that contracts are packaged to ensure adequate participation of international bidders.
- (c) *Sustainability Aspects*: The Country does not have specific sustainable procurement arrangements, nevertheless, it is very oriented in maintaining natural resources.
- (d) *Technological Aspects*: There seem to be some limitations on internet access and/or internet speed in the country. Further, there are risks of poor-quality computers being sold by locally established companies.
- (e) Given the nature and complexity of the contracts to be financed by the Project and due to their amounts, the international market will have to be approached in several cases, especially for complex consulting services and provision of some goods and services. Other activities may be procured locally, as stated below.

14. Project Operational Manual (POM): The Project Operational Manual covers the relevant procurement processes, including detailed institutional procedures, accountabilities, composition of technical and administrative evaluation committees, time frames for approvals, etc. The POM also covers topics related to conflicts of interest, fraud and corruption.

15. Frequency of procurement implementation support: Contracts subject to post review would be reviewed by the Bank once a year; and based on the findings of these reviews and the proposed ratings, the Bank may determine the revision of the prior review requirements.



ANNEX 2: Economic Analysis

COUNTRY: Guyana

Guyana Education Sector Program Project

This economic analysis focuses on the Project interventions expected benefits assessed through: (1) rationale for public sector provision, (2) World Bank value added, and (3) development impact of the Project.

Rationale for Public Sector Provision

1. Education is widely recognized as a public good and a right, which means its availability and quality should be guaranteed by the state. Education is an important part of human capital accumulation and it contributes to productivity, economic growth and poverty reduction. Research suggests that long-term economic growth is closely related to the level of cognitive skills of the population.⁴⁹ Education can also improve health, reduce crime and at-risk behaviors, facilitate civic participation, and yield inter-generational benefits. In the context of Guyana, where education is predominately provided by the public sector, government intervention is an effective way to realize these benefits. This is particularly true for the specific activities under this Project. The nursery level is critical to set up students for a lifetime of learning and can be underinvested in by parents, in particular in underserved areas. Education technology allows the Government to pilot innovations that have the power to transform its education system and improve equity. The EMIS is a critical tool to manage the education system, uniquely useful from the Government vantage point of the education system. Together, these interventions support students at critical junctures on their path through education and sets them up for success as productive citizens in the future.

Value added of Bank's Support

2. The World Bank has extensive experience supporting governments in improving their provision of education services, as well as experience in the sector in Guyana. The Bank has expertise across all levels of the education sector, including early childhood, education technology, and EMIS, and can draw expertise from a vast global knowledge depository. Furthermore, the Project builds on and complements other Bank-financed projects at the country level, including the previous Guyana Early Childhood Education Project (P129555, TF019053), the ongoing Secondary Education Improvement Project (P147924, IDA Credit No. 5473-GY), and the ongoing Guyana Education Sector Improvement Project (P159519, IDA Credit No. 6009-GY).

Development Impact of the Project

Component 1: Improved School Readiness for Nursery students

⁴⁹ Hanushek, Eric A.; Woessmann, Ludger. 2007. The Role of Education Quality for Economic Growth. Policy Research Working Paper; No. 4122. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/7154>
License: CC BY 3.0 IGO.



3. Improving the quality of Guyanese pre-school is a sine qua non condition to guarantee better education and ensure equal opportunities for all children throughout their lives. Ample international evidence⁵⁰ has shown that gaps in knowledge and ability between disadvantaged children and their more advantaged peers open early, tend to persist throughout life and are difficult and costly for countries to close. Thus, investing in early childhood education yields higher returns than investing in primary, secondary or higher education in terms of cognitive development, employment, college attendance and future earnings (Currie and Thomas, 2001⁵¹; Cunha et al., 2006⁵²; Cunha and Heckman, 2007⁵³; Chetty et al., 2011⁵⁴).

4. Evidence on early childhood interventions effectiveness: Component one aims is to promote equality, well-being and economic development in Guyanese society by standardizing and improving quality of education in nursery schools through (i) teacher training in a new curriculum and mentorship programs; (ii) provision of learning materials based on a new curriculum; and (iii) enhancing parents' capacity to be actively involved in their children's development and education. Similar interventions led in other developing countries had shown significant and positive impacts on children's cognition and development.

(a) Professional development programs targeting nursery teachers have provided major gains in child development outcomes: Teacher professional development is vital for improving the quality of education. Providing teachers with training sessions on a new curriculum and pedagogical approach has been proved to positively affect child learning outcomes (Halle et al., 2011⁵⁵; Gallego et al., 2019⁵⁶) and development (Egert et al., 2018)⁵⁷. In Peru, adopting a new pedagogical approach in mathematics improved children's numeracy skills by 0.11-0.19 standard deviations, and their capacity to understand shapes by 0.18-0.23 standard deviations (Gallego et al., 2019). Professional development programs conducted in Chile (prekindergarten and kindergarten) enhanced classroom organization and had positive effects on observed emotional and instructional support (Yoshikawa et al., 2015⁵⁸). Interventions focused on upgrading the quality of teacher-child interactions also decrease school absenteeism (-1 percent) and chronic absenteeism (-6 percent) (Hanno et al.,

⁵⁰ Examples include: James J. Heckman, *Early Childhood Education* (2016); Isabel V. Sawhill, Jeffrey Tebbs, William T. Sickens, *The Effects of Investing in Early Education on Economic Growth* (2006); OECD, *Investing in High Quality Early Childhood Education and Care* (2012).

⁵¹ Currie, J. (2001). Early childhood education programs. *Journal of Economic perspectives*, 15(2), 213-238.

⁵² Cunha, F., & Heckman, J. J. (2006). Identifying and estimating the distributions of ex post and ex ante returns to schooling: A survey of recent developments. unpublished paper, University of Chicago.

⁵³ Cunha, F., & Heckman, J. (2007). The technology of skill formation. *American Economic Review*, 97(2), 31-47.

⁵⁴ Chetty, R., Friedman, J. N., Hilger, N., Saez, E., Schanzenbach, D. W., & Yagan, D. (2011). How does your kindergarten classroom affect your earnings? Evidence from Project STAR. *The Quarterly journal of economics*, 126(4), 1593-1660.

⁵⁵ Zaslow, M., Martinez-Beck, I., Tout, K., & Halle, T. (2011). *Quality measurement in early childhood settings*. Baltimore: Brookes.

⁵⁶ Gallego, Francisco, Emma Naslund-Hadley, and Mariana Alfonso. "Changing Pedagogy to Improve Skills in Preschools: Experimental Evidence from Peru." *The World Bank Economic Review*, December 2019:

⁵⁷ Egert, F., Fukkink, R. G., & Eckhardt, A. G. (2018). Impact of in-service professional development programs for early childhood teachers on quality ratings and child outcomes: A meta-analysis. *Review of Educational Research*, 88(3), 401-433.

⁵⁸ Yoshikawa, H., Leyva, D., Snow, C. E., Treviño, E., Barata, M. C., Weiland, C., Gomez, C. J., Moreno, L., Rolla, A., D'Sa, N., & Arbour, M. C. (2015). Experimental impacts of a teacher professional development program in Chile on preschool classroom quality and child outcomes. *Developmental Psychology*, 51(3), 309-322:



2020)⁵⁹. This effect is stronger, particularly among disadvantaged children.

- (b) Potential gains on provision of learning materials:** Besides teacher training, the provision of resources such as exercise books will benefit children's learning path. Evidence suggests that providing learning material to schools where they are scarce can substantially increase test scores (Marlaine E. Lockheed and Hanushek 1988)⁶⁰. Distortions in an education model suggest that spending on non-teacher inputs will increase student performance much more than teachers' higher spending (Pritchett and Filmer 1999)⁶¹. Nevertheless, positive impacts on test scores can vanish and be concentrated in higher performing students when textbooks are written in a different language than no native (e.g. French or English for former colonies) or in scenarios in which volatility of government provided learning inputs lead to a storage of textbooks (and other learning materials) in order to smooth future consumption (Evans et al., 2014; Kremer et al., 2009)⁶².
- (c) Improving parental knowledge and involvement is crucial for ECD programs effectiveness:** Early childhood stimulation interventions change the way parents interact with their children by providing them information on propitious home environments to foster children's development. Evidence from St Lucia, Jamaica and Antigua (Chang et al., 2015)⁶³, suggests a positive impact on child development scores of 0.3 standard deviations driven mainly by better parenting knowledge. Other interventions carried out in developing countries (Chang et al., 2015; Hamadani et al., 2019⁶⁴; Frances et al., 2013⁶⁵; Frances et al., 2015⁶⁶; Hamadani et al., 2006⁶⁷; Sylvia et al., 2019⁶⁸; (Powell et al., 2004)⁶⁹ increased parental knowledge on child development by 0.4 standard deviations in Antigua,

⁵⁹ Hanno, E. C., & Gonzalez, K. E. (2020). The Effects of Teacher Professional Development on Children's Attendance in Preschool. *Journal of Research on Educational Effectiveness*, 13(1), 3-28.

⁶⁰ Lockheed, M. E., & Hanushek, E. (1988). Improving educational efficiency in developing countries: What do we know? *Compare*, 18(1), 21-38.

⁶¹ Pritchett, L., & Filmer, D. (1999). What education production functions really show: a positive theory of education expenditures. *Economics of Education review*, 18(2), 223-239.

⁶² Glewwe, P., Kremer, M., & Moulin, S. (2009). Many children left behind? Textbooks and test scores in Kenya. *American Economic Journal: Applied Economics*, 1(1), 112-35.

⁶³ Chang, Susan M., Sally M. Grantham-McGregor, Christine A. Powell, Marcos Vera-Hernández, Florencia Lopez-Boo, Helen Baker-Henningham, and Susan P. Walker. "Integrating a parenting intervention with routine primary health care: a cluster randomized trial." *Pediatrics* 136, no. 2 (2015): 272-280.

⁶⁴ Hamadani, J. D., Mehrin, S. F., Tofail, F., Hasan, M. I., Huda, S. N., Baker-Henningham, H., ... & Grantham-McGregor, S. (2019). Integrating an early childhood development programme into Bangladeshi primary health-care services: an open-label, cluster-randomised controlled trial. *The Lancet Global Health*, 7(3), e366-e375.

⁶⁵ Aboud, Frances E., Daisy R. Singla, Md Imam Nahil, Ivelina Borisova. 2013. "Effectiveness of a parenting program in Bangladesh to address early childhood health, growth and development" *Social Science & Medicine*, 97: 250-8

⁶⁶ Aboud, F. E., & Yousafzai, A. K. (2015). Global health and development in early childhood. *Annual review of psychology*, 66, 433-457.

⁶⁷ Hamadani, Jena D. Syed N. Huda, Fahmida Khatun, Sally M. Grantham-McGregor. 2006. "Psychosocial stimulation improves the development of undernourished children in rural Bangladesh." *Journal of Nutrition*, 136(10): 2645-2652.

⁶⁸ Hamadani, Jena D. Syed N. Huda, Fahmida Khatun, Sally M. Grantham-McGregor. 2006. "Psychosocial stimulation improves the development of undernourished children in rural Bangladesh." *Journal of Nutrition*, 136(10): 2645-2652.

⁶⁹ Luo, R., Emmers, D., Warrinnier, N., Rozelle, S., & Sylvia, S. (2019). Using community health workers to deliver a scalable integrated parenting program in rural China: A cluster-randomized controlled trial. *Social Science & Medicine*, 239, 112545.

⁶⁹ Powell, Christine, Helen Baker-Henningham, Susan Walker, Jacqueline Gernay, and Sally Grantham-McGregor. "Feasibility of integrating early stimulation into primary care for undernourished Jamaican children: cluster randomised controlled trial." *The Bmj* 329, no. 7457 (2004): 89



Jamaica and St. Lucia, and by 1.7 standard deviations in Bangladesh. Some of these interventions also improved children's home environments. Gertler et al. (2014)⁷⁰ found an increase in the home inventory index (+16percent) based on observations of parent-children interactions among other aspects. In South Africa, mothers enrolled in an early childhood stimulation program interacted with their children more sensitively and responsively (Cooper et al. 2009)⁷¹. This evidence suggests that ECD programs' positive effects are directly linked with propitious home environments and parent's involvement.

- (d) **Main gains of investing in ECD at home:** Hamadani et al. (2019) found a large effect of an ECD program relying on mother-child play sessions to stimulate children in Bangladesh. Child cognition improved by 1.3 standard deviations and the intervention had positive effects in language and motor skills. Evidence from a Caribbean nutritional supplementation and psychosocial stimulation program of 24 months had large positive impacts on cognitive development (+0.88 standard deviations), language and motor development (Grantham-McGregor et al., 1991)⁷². Sylvia et al. (2018)⁷³ found a similar result for child cognition after six months of a home-based parenting program in China. Berhanu Nigussi et al. (2018)⁷⁴ find statistically positive effects of a home-based play assisted stimulation on language (effect size of +0.55), personal-social and socio-emotional performances (effect size +0.56 and -1.28 respectively) after six months. Additional programs implemented in developing countries (Frances et al., 2013⁷⁵; Frances et al. 2011⁷⁶; Hamadani et al., 2006⁷⁷; Nahar et al., 2012⁷⁸) had smaller impacts on development outcomes varying between 0.15-0.55 standard deviations.

5. Without receiving adequate stimulation in early childhood, children may enter school ill-prepared and be more likely to have poor academic performance, to repeat grades and to drop out of school compared to children whose cognitive skills and overall school readiness are higher upon primary

⁷⁰ Gertler, P., Heckman, J., Pinto, R., Zanolini, A., Vermeersch, C., Walker, S., ... & Grantham-McGregor, S. (2014). Labor market returns to an early childhood stimulation intervention in Jamaica. *Science*, 344(6187), 998-1001.

⁷¹ Cooper, Peter J., Mark Tomlinson, Leslie Swartz, Mireille Landman, Chris Molteno, Alan Stein, Klim McPherson, and Lynne Murray. "Improving quality of mother-infant relationship and infant attachment in socioeconomically deprived community in South Africa: randomised controlled trial." *Bmj* 338 (2009): b974

⁷² Grantham-McGregor, Sally, Christine Powell, Susan Walker, and John Himes. 1991. "Nutritional Supplementation, Psychosocial Stimulation, and Mental Development of Stunted Children: The Jamaican Study." *The Lancet* 338 (8758): 1-5.

⁷³ Sylvia, S., Warrinnier, N., Renfu, L., Yue, A., Attanasio, O. P., Medina, A., & Rozelle, S. (2018). *From quantity to quality: Delivering a home-based parenting intervention through China's family planning cadres* (No. 402). LICOS Discussion Paper.

⁷⁴ Worku, Berhanu Nigussie, Teklu Gemechu Abessa, Mekitie Wondafrash, Johan Lemmens, Jan Valy, Liesbeth Bruckers, Patrick Kolsteren, and Marita Granitzer. "Effects of home-based play-assisted stimulation on developmental performances of children living in extreme poverty: a randomized single-blind controlled trial." *BMC pediatrics* 18, no. 1 (2018): 29.

⁷⁵ About, Frances E., Daisy R. Singla, Md Imam Nahil, Ivelina Borisova. 2013. "Effectiveness of a parenting program in Bangladesh to address early childhood health, growth and development" *Social Science & Medicine*, 97: 250-8

⁷⁶ About, Frances E., and Sadika Akhter. "A cluster-randomized evaluation of a responsive stimulation and feeding intervention in Bangladesh." *Pediatrics* 127, no. 5 (2011): e1191-e119

⁷⁷ Hamadani, Jena D. Syed N. Huda, Fahmida Khatun, Sally M. Grantham-McGregor. 2006. "Psychosocial stimulation improves the development of undernourished children in rural Bangladesh." *Journal of Nutrition*, 136(10): 2645-2652.

⁷⁸ Nahar, Baitun, M. I. Hossain, J. D. Hamadani, T. Ahmed, S. N. Huda, S. M. Grantham-McGregor, and L. A. Persson. "Effects of a community-based approach of food and psychosocial stimulation on growth and development of severely malnourished children in Bangladesh: a randomised trial." *European Journal of Clinical Nutrition* 66, no. 6 (2012): 701-709



school entry (Heckman and Masterov, 2007⁷⁹; Reynolds et al., 2001⁸⁰; Feinstein, 2003⁸¹; Pianta and McCoy, 1997⁸²; Currie and Thomas, 1999⁸³). Improvements to the quality of the early education offered to nursery students in the hinterland would foster equality and positive outcomes, including building valuable skills, boosting these students' earning potential, and ultimately strengthening Guyana's workforce, helping to grow its economy.

Component 2: EdTech at primary education

6. Digital learning has the potential to offer high-quality education at lower costs, in particular to students in remote areas where the number of qualified teachers is limited. Moreover, tutorials including well-designed educational games involving math problem solving, can sustain student's interest and curiosity, making school more attractive. Motivated students will learn in a stimulating and flexible way, allowing them to improve their cognitive skills.⁸⁴

7. Evidence of EdTech impacts on learning outcomes: Although still understudied, a systematic review of the literature suggests that computer-assisted learning (CAL) holds promise to improve learning outcomes (Escueta et al., 2017)⁸⁵. In the United States, for instance, an online program that provides students with immediate feedback on math homework for less than 30-40 minutes per week had an effect size of 0.18 standard deviations, and a software-based math curriculum intervention significantly increased seventh and eighth-grade math scores by 0.63 and 0.56 standard deviations, respectively (Roschelle et al., 2016⁸⁶; Roschelle et al., 2010⁸⁷). EdTech can also be used in other subject areas, such as literacy. Kalil et al. (2020)⁸⁸ show that children exposed to the web-based program intended to increase preschool and primary school children's vocabulary score (+0.23 standard deviations). In India, adaptive learning software also led to a positive impact of 0.37-0.47 standard deviations on mathematics and 0.23 standard deviation in Hindi (Banerjee et al., 2007⁸⁹; Muralidharan et al., 2019). These programs could benefit students who are left behind in traditional instruction by providing tailored instruction (exercises

⁷⁹ Heckman, J. J., & Masterov, D. V. (2007). The productivity argument for investing in young children. *Applied Economic Perspectives and Policy*, 29(3), 446-493.

⁸⁰ Reynolds, A. J., Temple, J. A., Robertson, D. L., & Mann, E. A. (2001). Long-term effects of an early childhood intervention on educational achievement and juvenile arrest: A 15-year follow-up of low-income children in public schools. *Jama*, 285(18), 2339-2346.

⁸¹ Feinstein, L. (2003). Inequality in the early cognitive development of British children in the 1970 cohort. *Economica*, 70(277), 73-97.

⁸² Pianta, R. C., & McCoy, S. J. (1997). The first day of school: The predictive validity of early school screening. *Journal of Applied Developmental Psychology*, 18(1), 1-22.

⁸³ Currie, J., & Thomas, D. (1999). *Early test scores, socioeconomic status and future outcomes* (No. w6943). National bureau of economic research.

⁸⁴ Education Commission 2016.

⁸⁵ Escueta, M., Quan, V., Nickow, A. J., & Oreopoulos, P. (2017). *Education technology: An evidence-based review* (No. w23744). National Bureau of Economic Research.

⁸⁶ Roschelle, J., Feng, M., Murphy, R. F., & Mason, C. A. (2016). Online mathematics homework increases student achievement. *AERA open*, 2(4), 2332858416673968.

⁸⁷ Roschelle, J., Shechtman, N., Tatar, D., Hegedus, S., Hopkins, B., Empson, S., ... & Gallagher, L. P. (2010). Integration of technology, curriculum, and professional development for advancing middle school mathematics: Three large-scale studies. *American Educational Research Journal*, 47(4), 833-878.

⁸⁸ Kalil, A., Mayer, S., & Oreopoulos, P. (2020). Closing the Word Gap with Big Word Club: Evaluating the Impact of a Tech-Based Early Childhood Vocabulary Program.

⁸⁹ Banerjee, A. V., Cole, S., Duflo, E., & Linden, L. (2007). Remedying education: Evidence from two randomized experiments in India. *The Quarterly Journal of Economics*, 122(3), 1235-1264.



and other activities), reducing the existing mismatch between classroom instruction and student preparation (Banerjee and Duflo, 2012)⁹⁰.

- (a) **Computer-assisted learning as a channel to improve school learning environment and school-teachers productivity:** Computer assisted learning (CAL) remains a powerful tool to improve teacher and school productivity by supporting teachers to perform routine tasks (such as grading) and to provide tailored feedback and instruction to students (Muralidharan et al., 2019)⁹¹. School learning environment has been by CAL programs. In Chile, researchers found that adopting CAL at school changed the ways in which students were engaged by math content, and also changed the interaction between teachers and students (Light et al., 2014)⁹².
- (b) **Barriers to CAL program's effectiveness:** In the particular case of Khan Academy, impact evaluations have brought mixed results. In Sri Lanka, Khan Academy tutorials improved test scores in Mathematics among ninth-grade students in Sinhala-medium public schools (Weeraratne B. et al., 2018)⁹³. Another randomized controlled trial conducted in Brazilian public primary schools found positive effects on measures of attitudes towards math, which were not translated into a positive average treatment effect on students' math proficiency due to infrastructure challenges (Ferman et al., 2019)⁹⁴. Effectiveness of computer-assisted learning may rely on curriculum delivery modality as a substitute or complement to traditional learning to be implemented inside or outside the school (Muralidharan et al., 2019⁹⁵; Banerjee et al., 2007). Another impact evaluation found no impacts for the large-scale randomized evaluation of the One Laptop Per Child Program in rural Peru (Severín et al., 2017). They identified two plausible explanatory factors: the lack of software content directly linked with math and language subjects and the lack of explicit instruction on the utility of software pedagogical activities. These results coincide with research evidence suggesting that technology-assisted learning programs effectiveness are directly linked with (1) the specificities of software design for academic purposes (Villarán, 2010)⁹⁶, (2) clear instruction on content utility for specific curricular goals (Dynarsky et al., 2007⁹⁷; Banerjee et al., 2007⁹⁸; Linden and MacLeod, 2008⁹⁹; Barrow

⁹⁰ Banerjee, Abhijit and Esther Duflo, *Poor economics: A radical rethinking of the way to fight global poverty*, New York, NY: *Public Affairs*, 2012.

⁹¹ Muralidharan, K., Singh, A., & Ganimian, A. J. (2019). Disrupting education? Experimental evidence on technology-aided instruction in India. *American Economic Review*, 109(4), 1426-60.

⁹² Light, D., & Pierson, E. (2014). Increasing student engagement in math: The use of Khan Academy in Chilean classrooms. *International Journal of Education and Development using Information and Communication Technology*, 10(2), 103-119.

⁹³ Weeraratne, B., & Chin, B. (2018). Can Khan Academy e-Learning Video Tutorials Improve Mathematics Achievement in Sri Lanka? *International Journal of Education and Development using Information and Communication Technology*, 14(3), 93-112.

⁹⁴ Ferman, B., Finamor, L., & Lima, L. (2019). Are Public Schools Ready to Integrate Math Classes with Khan Academy?

⁹⁵ Muralidharan, K., Singh, A., & Ganimian, A. J. (2019). Disrupting education? Experimental evidence on technology-aided instruction in India. *American Economic Review*, 109(4), 1426-60.

⁹⁶ Villarán, V. (2010). Evaluación Cualitativa del Programa Una Laptop por Niño: Informe Final. Lima, Peru: *Universidad Peruana Cayetano Heredia*. Mimeographed document.

⁹⁷ Dynarski, M., Agodini, R., Heaviside, S., Novak, T., Carey, N., Campuzano, L., ... & Emery, D. (2007). Effectiveness of reading and mathematics software products: Findings from the first student cohort.

⁹⁸ Banerjee, A. V., Cole, S., Duflo, E., & Linden, L. (2007). Remedying education: Evidence from two randomized experiments in India. *The Quarterly Journal of Economics*, 122(3), 1235-1264.

⁹⁹ Linden, L. L., & MacLeod, M. (2008). How to teach English in India: Testing the relative productivity of instruction methods within the Pratham English language education program.



et al., 2009¹⁰⁰) and (3) school infrastructure (Ferman et al., 2019)¹⁰¹.

Component 3: Education Management Information System (EMIS) scale-up and technical and operational support.

8. A successful education management information system (EMIS)¹⁰² can inform policy formulation, education planning and improve monitoring and evaluation of education systems (Abdul-Hamid, 2017¹⁰³; Zhang et al., 2018¹⁰⁴). The EMIS can also increase transparency and accountability, and in turn, promote equality. The final result is a higher functioning education system, which will ensure better educational outcomes for students. Moreover, the EMIS can foster transparency, accountability and promote policy dialog by providing quality data and knowledge to a broader community (schools, teachers and parents, researchers, non-governmental organizations, multilateral organizations), allowing stakeholders to make informed decisions. An EMIS can also be used as an early warning system to help schools identify and assist at-risk students in preventing drop out.

9. Fostering a culture of data in the education system where data is expected, valued and used is essential to benefit from EMIS advantages. In this context, teacher training appears as the main channel to introduce the data-driven culture in schools. In the U.S., a teacher training on the value and use of data was related to an increased in students learning outcomes (reading and math) after two years of implementation¹⁰⁵. Furthermore, the adoption of tablets, computers (among other new technological tools) opens the possibility to exploit detailed data automatically stored in school devices. It facilitates data collection and decreases related costs (both human and financial). Components 2 & 3 of the current project are complementary in opening new opportunities to improve the education system by creating and using data from new technologies devices.

10. Accurate and timely data is critical for informed decision-making to ensure that resources and time is placed where they are most needed. It is necessary to ensure a transparent information cycle, a multifaceted system and data coverage to guarantee EMIS effectiveness (Abdul-Hamid, 2017)¹⁰⁶. A high functioning EMIS can contribute to a more efficient and higher performing education system that will ensure better educational outcomes, and subsequently bring social and economic benefits. The current project provides project management, monitoring and evaluation bringing valuable feedback on implementation challenges and data culture adoption in Guyana.

¹⁰⁰ Barrow, L., Markman, L., & Rouse, C. E. (2009). Technology's edge: The educational benefits of computer-aided instruction. *American Economic Journal: Economic Policy*, 1(1), 52-74.

¹⁰¹ Ferman, B., Finamor, L., & Lima, L. (2019). Are Public Schools Ready to Integrate Math Classes with Khan Academy?

¹⁰² EMIS Definition: Data system that collects, monitors, manages, analyses, and disseminates information about education inputs, processes, and outcomes—in particular, student learning. Abdul-Hamid, H. (2017). Value of Data: Better Data, Better Education.

¹⁰³ Abdul-Hamid, H. (2017). Value of Data: Better Data, Better Education.

¹⁰⁴ Zhang, L., Zhang, M., & Pan, X. (2018). Strategies for the Improvement of Quality of China's Basic Education. In 2018 2nd International Conference on Management, Education and Social Science (ICMESS 2018). *Atlantis Press*

¹⁰⁵ DQC (Data Quality Campaign). 2015. "EMIS in Different Country Contexts." Presented by Paige Kowalski at the World Bank Education Staff Development Program, Washington, DC.

¹⁰⁶ Abdul-Hamid, H. (2017). Value of Data: Better Data, Better Education.



11. **Theory of change:** Based on the evidence cited above, this Project is expected to benefit children through an improvement of their cognitive skills, learning and development outcomes (language, motor and socio-emotional performances), a better learning environment as well as an improved institutional capacity and governance (figure 1).

12. **Economic Analysis:** The efficiency of the Guyana Education Sector Program Project is quantified through a cost and benefits analysis. The expected benefits derive from an increase in the beneficiary’s educational attainment that will, in turn, enhance their productivity and earnings over their lifetime. The cost and benefits analysis of the project focuses on benefits that are reasonably monetized, in this case, returns to education. Economic benefits from EMIS scaling up nationwide (component 3) were not included in the analysis due the difficulty of measuring and assigning the activity an economic value.

13. **Methodology:** The Project impacts beneficiaries by increasing years of schooling and, thus, educational attainment. Monetization of benefits requires the quantification of the returns to an additional year of schooling. In Guyana, the rate of return to education has been estimated as 3.3 percent. This result comes from a study in returns to education led worldwide by Patrinos et al. (2014)¹⁰⁷. The study uses the Mincer Equation (1974);

$$Y = \alpha + \beta S + \gamma X + \varepsilon$$

where Y is the increase in adult earnings, S represents years of schooling, X is a set of control variables, and ε is an error term. The main outcome of interest is coefficient β which is equal to 3.3 percent for Guyana estimation. Interpretation of coefficient β implies an annual earnings increase of 3.3 percent for an additional year of schooling. This implies that once in the labor market, annual incremental increase in salary remains the same throughout the beneficiary’s lifetime. The project is expected to benefit 19,088 students per year benefits (4.588 and 14.500 students per year for components 1 and 2, respectively). Table 1 shows assumptions as well as main variables, data sources and calculations that were necessary to perform the economic analysis of this project.

Table 1. Summary of Key Parameters

Variable	Estimates	Source
Discount rate	5%	Assumption (World Bank standard for Guyana)
Average size of nursery classes	16-25	World Data on Education 7th edition (UNESCO, 2011)
Number of students per class in primary school (max according to government regulations)	30	World Data on Education 7th edition (UNESCO, 2011)
GDP per capita (USD)	\$ 4,979	World Bank (2018)

¹⁰⁷ Montenegro, C. E., & Patrinos, H. A. (2014). *Comparable estimates of returns to schooling around the world*. The World Bank.



Average retirement age	60	Assumption
Average age receiving training and entering labor market	20	Based on the age and duration of different school levels in St.Lucia (P170445, used as a proxy)
Number of years the intervention has an impact	30	Assumption
Labor market participation rates by education levels (% annual) in Guyana		
Early Childhood Education	48,7%	ILOSTAT Database, 2018
Primary	43,7%	
Upper secondary	65,2%	
Post-secondary non-tertiary education	78,7%	
Completion rates		
Primary	95,7%	UNESCO Database, 2014
Lower Secondary	56,2%	

14. Main Results: The Project’s net present value (NPV) is estimated at US\$18.5 million. Expected results show that the program is expected to increase annual earnings by 4 percent and is associated with an internal rate of return (or the return rate that brings the net present value to zero) equal to 10 percent. IRR is higher than the discount rate considered for the Project (5 percent) and robust considering a sensitive analysis. This result suggests that investing in this project is worthwhile.



Table 2. Summary of Costs-Benefits Analysis

	Baseline Analysis	Sensitive Analysis: Upper-end estimates for impact on earnings
NPV	USD\$ 18,471,038	USD\$ 135,967,465
IRR	10%	17%
Benefit-cost ratio	3,9	22,3

15. Limits of the ex-ante analysis: The cost-benefits analysis considers exclusively the investment (USD\$ 6.7 million) distributed accordingly to three different components: USD\$ 1.8 million will be allocated to component 1, another USD\$ 3.8 million will finance component 2 and USD\$ 1.1 million will be assigned to the implementation of component 3. Additional costs associated with interventions' operation and maintenance once the initial investment is completed are being estimated and these figures may be adjusted as costs are finalized over the project preparation period. To this extent, the benefit-cost ratio is expected to decrease marginally. However, total project benefits are expected to be higher than those captured in the economic analysis due to various incalculable benefits, especially for benefits from scaling up EMIS (component 3), that could not be clearly monetized.