

TC DOCUMENT

I. Basic Information for TC

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| ▪ Country/Region: | Paraguay |
| ▪ TC Name: | Supporting the development of 21st century skills through coding education |
| ▪ TC Number: | PR-T1245 |
| ▪ Team Leader/Members: | Maria Mercedes Mateo-Berganza Diaz - Team Leader, Changha Lee, Juanita Caycedo Duque, Rodolfo Andres Scannone Chavez (SCL/EDU); Diego Recalde (CSC/CPR), Alvaro Sanmartin (LEG/SGO) |
| ▪ Taxonomy: | Client Support |
| ▪ Date of TC Abstract authorization: | 02 Jul 2018 |
| ▪ Beneficiary: | Ministry of Education and Culture of Paraguay (MEC) |
| ▪ Executing Agency: | Inter-American Development Bank, through the Education Division |
| ▪ Donors providing funding: | Korea Poverty Reduction Fund (KPR) |
| ▪ IDB Funding Requested: | US\$950,000.00 |
| ▪ Local counterpart funding, if any: | US\$100,000.00 (in kind MEC), US\$750,000.00 (parallel funding by SK Telecom) |
| ▪ Disbursement period: | 36 months (execution period: 30 months) |
| ▪ Required start date: | 09/01/2018 |
| ▪ Types of consultants: | Firm and Individuals |
| ▪ Prepared by Unit: | SCL/EDU |
| ▪ Unit of Disbursement Responsibility: | CSC/CPR |
| ▪ TC included in Country Strategy (y/n): | No |
| ▪ TC included in CPD (y/n): | No |
| ▪ Alignment to the Update to the Institutional Strategy 2010-2020: | Social inclusion and equality |

II. Objectives and Justification of the TC

- 2.1 **Objective.** This TC aims to support Paraguayan youth to develop 21st century skills, such as creativity, computational thinking and problem-solving skills, through coding education. The specific objectives of the TC are to: (i) support the implementation of the pilot coding education in selected primary schools; (ii) build capacity of teachers to deliver coding classes; (iii) analyze the effects of coding education on student learning and development of 21st century skills; and (iv) support the development of a public policy on ICT education by contributing to create a shared vision among key stakeholders and disseminate the results of the project.
- 2.2 **Justification.** In today's society in which information and communication technology (ICT) pervades virtually every aspect of our life and work, digital literacy plays a vital role in defining a student's ability to thrive both during and beyond school. Students unable to navigate through the complex digital world will no longer be able to fully

participate in the rapidly changing economic, social and cultural landscape (OECD 2015). In particular, coding/programming education can create new opportunities for youth by equipping them with the knowledge and skills necessary for the information age, commonly referred to as the 21st century skills, such as creativity, computational thinking and problem-solving skills.

- 2.3 Many countries around the world are undertaking various activities to promote coding education with multiple motivations, including: (i) advancement of 21st century skills to ensure that students are adequately equipped with the skills and competencies highly demanded in the future; (ii) workforce development to secure a pipeline of ICT talents crucial for national economic competitiveness given the increasing need for programming and coding skills even in non-ICT professions (e.g. research, marketing, medicine) in the onset of the fourth industrial revolution¹; and (iii) improvement of instructional practice to better engage students and enhance learning through shifting towards constructivism, informed by Seymour Papert and the “maker learning” movement². Increasing number of countries, including Korea, Finland, the United Kingdom, India and Poland, are taking a step further and are adopting coding education in their formal education systems to ensure that every student has the opportunity to access coding education and to promote equity and quality of coding education in their countries.
- 2.4 In fact, a growing body of research suggests that effective use of technology can significantly enhance the learning process by enabling real-time monitoring and personalized instruction, increasing student motivation and participation (Ortiz & Cristia, 2014), and improving learning outcomes (Muralidharan, Singh, & Ganimian 2017). Studies analyzing the effects of Scratch, an interactive coding program, suggest that it helped students to develop mathematical concepts (Calder, 2010) and improve reading comprehension skills (Papatga & Ersoy, 2016). Research also suggests that coding education can naturally engage students as students learn by doing through the hands-on, constructivist learning approach and as students are more likely to find the concepts and skills relevant to their daily and future lives³. Given these positive effects, introducing coding education to Paraguay has the potential to improve student engagement and educational outcomes.
- 2.5 **Paraguayan Context.** Paraguay, with a population of some 6.7 million and a growing economy with a gross domestic product of \$27.4 billion, has made significant progress in expanding access to education. Yet, delivering quality education and addressing the urban-rural divide remain a persistent challenge. The results of the national exams SNEPE show that a large proportion of students does not achieve the basic performance level expected for their grade in language and mathematics⁴. On the

¹ Burning Glass Technologies. “[Beyond Point and Click: The Expanding Demand for Coding Skills](#)” (2016) and the World Economic Forum (2016) “[The Future of Jobs](#)” (2016).

² The theory of constructivism suggests that learners construct their knowledge through personal inquiry and experiences. Constructivism is often associated with active, hands-on learning. Papert, Seymour and Idit Harel. (1991) “Situating constructionism.” *Constructionism* 36(2): 1-11; Flores, C. (2016). “[Constructionism, a Learning Theory and a Model for Maker Education](#)”

³ Some educators seek to capitalize on coding and programming education as a useful vehicle to shift to constructionist pedagogy as the computers and coding, by nature, allow students to naturally learn through practice. For more information, see National Research Council (2011). “[Report of a Workshop of Pedagogical Aspects of Computational Thinking](#).”

⁴ The results of national exam SNEPE (el Sistema Nacional de Evaluación del Proceso Educativo) show that, in language, 30-45% of students, depending on the grade, do not achieve more than Level I out of IV. More than 50% of the 3rd graders do not reach level II in mathematics (simple problem-solving involving

regional standardized exam TERCE, Paraguayan students performed below the Latin American average, and the results demonstrated a stark achievement gap between urban and rural schools⁵.

- 2.6 To support student learning, the Paraguayan government has strived to harness the power of ICTs. In 2009, the Paraguayan Ministry of Education and Culture (MEC) established the Policy for the Incorporation of ICT in the Education System with the support of the IDB. The policy aimed to “contribute to the improvement of education through the use of ICT and support all students to develop digital competencies necessary to participate and actively contribute in society” (MEC, 2009). The National Education Plan 2024⁶ and Educational Agenda 2013-2018⁷ also place specific emphasis on the use of ICT in teaching and school management to improve access to and quality of education. Funding allocations illustrate the Paraguayan government’s commitment to improve student learning outcomes by incorporating ICT in classrooms. In 2012, the government increased education funding through Law 4.758, creating the National Public Investment and Development Fund (FONACIDE). The largest component of FONACIDE was improving learning conditions by harnessing ICTs (USD 145 million) (MEC, 2012).
- 2.7 While Paraguay has established a policy framework, allocated budget for ICT infrastructure and expanded access to computers, content development and teacher training remain a critical task before implementing coding education. Only 7% of teachers received training in the pedagogical use of ICT and 7% of the teachers reported to use the computer (MEC, 2013). To take full advantage of the increased access to computers, Paraguay needs to now focus on developing content and strengthening teacher ICT capacity to provide well-designed coding education that can effectively improve student academic performance and support students to develop 21st century skills.
- 2.8 **Project Strategy.** The TC will build on the progress made by recent educational policies and cooperation projects and support the implementation of pilot coding classes in selected primary schools. The recent school-day extension provides the time and space necessary to introduce coding education to the formal education system. Through the IDB Project to Support Extended School Days (PR-L1097; 3660/OC-PR), 1,200 primary schools will be increasing the amount of time that pupils (aged 6-11) spend in school each day from four to eight hours. 100 schools selected from these schools will participate in the TC, and coding classes will be provided during the extended hours to complement basic education.
- 2.9 In preparation for the pilot classes, the TC will finance the development of culturally-relevant learning materials for coding education and support the capacity

addition and multiplication, extracting information from tables, and understanding of decimals) (MEC, 2010).

⁵ The Third Regional Comparative and Explanatory Study (TERCE) assesses the learning achievements of students in third and sixth grades in mathematics and reading. Of the 15 countries that participated in 2013, Paraguay was one of the countries with the highest dispersion in scores, with the differences in performance between urban and rural schools up to 74 points in 6th grade reading, 49 points in 3rd grade reading, and 33 points in 6th grade mathematics (UNESCO 2015).

⁶ The National Education Plan 2024, in force since 2009, aims to ensure equity in access to education, improve the quality of education, and offer education that meets the needs and challenges of the rapidly changing world (MEC 2009).

⁷ The Educational Agenda 2013-2018 defines the implementation strategy, intervention areas, main activities, and evaluation processes and reflects the priorities of the current MEC administration. The Agenda identifies incorporating ICT into the national education system as one of its objectives and priority areas.

building of teachers to equip them with the necessary pedagogic skills and knowledge of digital tools to effectively guide their students. The TC will also finance the monitoring and impact evaluation of the pilot project to assess its effect on student learning and development of 21st century skills. The study will complement the findings from the impact evaluation of the new pedagogical model on learning outcomes of children from vulnerable families and generate useful evidence for decision-making for future scaling up and expansion of the program.

- 2.10 To effectively undertake these activities, the TC will be executed in close collaboration with Korean experts on coding education. As a forerunner in ICT, Korea has been internationally recognized as one of the countries with the highest level of digital skills. In both 2009 (ranked 1st) and 2012 (2nd), Korean students excelled in digital reading and computer-based mathematics tests in the OECD Program for International Student Assessment (PISA). Korea has also consistently held one of the top rankings in the International Telecommunication Union (ITU)'s ICT Development Index since 2009. In 2014, acknowledging the importance of software behind the industrial products and services that propelled its economic growth and technological advancement, Korea introduced the "Promotion Plan to Train Talent for Software-Focused Society" that expanded and strengthened its software education with the goal of providing software education in all elementary and middle schools in 2018 (Ministry of Education 2015). While the history of software education is fairly short in Korea, its software education curriculum has been recognized globally and the initial results have been mostly positive⁸. The Korean experience of piloting, scaling and expanding software education throughout the past five years will provide valuable insights and lay out the groundwork for creating an enabling environment for the provision of pilot coding education in Paraguay.
- 2.11 **Relevant Bank operations in the country and the region.** This TC will build on prior and ongoing projects in Paraguay. Currently the IDB is implementing two technical cooperation projects with the support of the Korean Poverty Reduction Fund: Public-Private Partnerships for Educational Innovation in Paraguay, commonly referred to as the Scholas project (PR-T1180; ATN/KP-15013-PR), and Interactive Music Education Program (RG-T2512; ATN/KP-14573-RG). The Scholas project aims to improve the education of children living in the most vulnerable communities by utilizing innovative pedagogies focusing on technology, sports and the arts. The music education project aims to expand quality music education through the guided use of online platforms and capacity building of local partners. This TC shares the vision of these projects in empowering disadvantaged youths and providing quality education that caters to students' diverse interests through the use of technology. The TC may also help to enrich the educational digital platform created through the two projects with additional digital contents and instructional support tools. Furthermore, it will complement previous Bank efforts to strengthen public-private partnerships in education through engaging various actors in the education community, raising public awareness on the effectiveness and importance of partnerships, helping governments

⁸ The results of pre-post test on the effectiveness of software education implemented in software research schools for 8,593 elementary and middle school students revealed improvements in student computational skills and attitudes (KERIS 2017). In line with the findings, a survey of students in participating schools found that 74% of students were satisfied with the curriculum, and students identified the opportunity to use new tools as the number-one factor for why they enjoyed the software classes (30%), followed by the opportunity for active participation (28%) (Ministry of Science, ICT and Future Planning 2015).

co-finance education services and ensuring continuity of effective policies and programs.

- 2.12 **Institutional Strategy Alignment.** The TC is consistent with the Update to the Institutional Strategy 2010-2020 (AB-3008) and is aligned with the following development challenges: (i) social inclusion and equality; and (ii) productivity and innovation. It contributes to fostering high-quality human capital by improving access to better education offerings and highly promising sets of skills particularly for the vulnerable student population. The TC is also aligned with the cross-cutting theme of Gender Equality by equipping the ICT literacy skills of both boys and girls, and the theme of Institutional Capacity by introducing coding education, the state-of-the-art pedagogy, and suggesting the guidelines for a future scale-up. It is in line with Bank's Sector Framework Document for Education and Early Childhood Development (GN-2708-5), particularly with Dimension of Success 5, given its focus on student development of 21st century skills to prepare them for the labor market and contribute to the society. The TC also corresponds to the objective of the Korea Poverty Reduction (KPR) Fund by promoting poverty reduction within the Latin American region.

III. Description of Activities/Components and Budget

- 3.1 This TC will finance the following three components: (i) implementation of pilot coding classes in selected primary schools; (ii) impact evaluation of the effects of pilot classes on student learning and development of 21st century skills; and (iii) knowledge sharing, policy design, and dissemination of results.
- 3.2 **Component 1: Pilot program for coding education in Paraguay (\$1,400,000).** The TC will finance the preparation and application of pilot coding classes in selected primary schools in Paraguay. In preparation for the classes, the TC will finance the development of culturally-relevant learning materials for coding education and provide training workshops for teachers and teaching assistants (8th graders in the same schools) to equip them with necessary pedagogical skills and knowledge of the digital tools to effectively guide their students. Approximately 2000 1st grade students, 100 1st grade teachers, 500 teaching assistants (8th graders) across 100 schools in Paraguay will participate and benefit from the current TC.
- 3.3 **Component 2: Impact evaluation of the pilot program (\$150,000).** The project will finance an experimental design of the pilot and impact evaluation of the pilot program. To ensure that statistical inferences can be drawn, participating schools will be selected randomly and assigned to treatment and control groups among the 600 schools implementing the extended school day program (through the IDB loan PR-L1097; 3660/OC-PR). In schools where there is more than one first-grade class, the treatment class will also be randomly selected. The collection of the baseline and data processing will take place at the beginning of the school year and the application of evaluation instruments will take place during the last months of the school year. The evaluation aims to measure the effects of pilot coding classes on student learning (mathematical and reading skills) and student development of 21st century skills (creativity, computational thinking, and problem-solving skills) (see Section 2.4 for more information on the impact of coding education on students' cognitive and non-cognitive skills) and compare the results between treatment and control groups. Alongside the impact evaluation, the project implementation process will be closely monitored and evaluated to ensure intended outcomes of the program. The study will

generate useful evidence for decision-making for future scaling up and expansion of the program.

3.4 Component 3: Knowledge sharing, policy design, and dissemination of results (\$250,000). As part of the knowledge sharing activities, the TC will finance an international conference in Paraguay on ICT education that introduces and discusses how different countries around the world have leveraged and incorporated ICT in their education systems (Korea, Uruguay, Estonia, etc.). In addition to the pilot program, this activity will serve as the basis for the development of a blueprint and volumetric analysis for the countrywide implementation of ICT education in Paraguay. Findings from these activities and the pilot program will be shared and disseminated through workshops, reports, videos, newsletters, blogs, etc.

3.5 The total cost of this TC will be US\$1,800,000, of which US\$950,000 will be financed by the Korea Poverty Reduction (KPR) Fund, and US\$100,000 is in-kind local counterpart funding. Coding robots and learning materials valued at \$750,000.00 will be provided by SK Telecom through parallel financing. In agreement with KPR operational guidelines, the budget for acquisition of hardware and software shall not exceed 30% of the total project resources.

Indicative Budget

| Activity/Component | Description | IDB/Fund Funding | SKT Parallel Funding | Paraguay MEC Counterpart Funding | Total Funding |
|--|--|-------------------------|-----------------------------|---|----------------------|
| Component 1: Pilot program for coding education in Paraguay | (i) Establishment of a local partnership (ii) Development of a curriculum and lesson plans (iii) Teacher/tutor training workshops (iv) Hardware support | 600,000 | 750,000 | 50,000 | 1,400,000 |
| Component 2: Impact evaluation of the pilot program | (i) Impact evaluation design (ii) Impact evaluation report | 150,000 | - | - | 150,000 |
| Component 3: Knowledge sharing, policy design, and dissemination of results | (i) International conference on ICT education in Paraguay (ii) Report on the blueprint of ICT education in Paraguay (iii) Workshop (iv) Blog and video | 200,000 | - | 50,000 | 250,000 |
| TOTAL | - | 950,000.00 | 750,000.00 | 100,000.00 | 1,800,000.00 |

IV. Executing Agency and Execution Structure

- 4.1 The TC builds on existing technical cooperation to improve the quality of education in Paraguay. To ensure linkages with the overarching initiative, and in accordance with a request from the Ministry of Education (See Annex I), TC will be executed by the IDB. According to TC guidelines (GN-2629-1), this is justified by the fact that complying with internal requirements would delay the execution of the TC, jeopardizing the achievement of its objectives⁹. All disbursements will be executed through the Bank's systems and will require approval from SCL/EDU. The Bank will contract individual consultants, consulting firms and non-consulting services in accordance with Bank's current procurement policies and procedures (GN-2303-20). The TC will be executed over a period of 30 months and disbursed over a period of 36 months as of the date of approval.
- 4.2 SK Telecom and KERIS will be partners for the implementation of the current TC (See Annex V & VI). SK Telecom is globally recognized for Albert Coding Robots and the coding software programs and its already-established network and experience in LAC will ensure smooth implementation and deliver results. KERIS (Korea Education and Research Information Service) is a national research institute focused on the use of ICT in the education system in Korea. Its technical expertise and the lessons learned from the implementation of ICT education in Korea are paramount to the success of this TC and will be transmitted through multiple channels such as teacher/tutor workshops and various knowledge sharing activities.

V. Major Issues

- 5.1 The TC is directly aligned with the Paraguayan government's commitment to harness the power of ICT to improve its education system, as demonstrated by the funding allocation (See Section 2.6) and is highly likely to receive strong governmental support. Furthermore, recently implemented school-day extension provides the time and space necessary to introduce coding education to the formal education system. To mitigate the potential risk of underutilization of the knowledge and skills acquired from this intervention, the following two strategies will be applied: (i) at the systemic level, strong links will be created between this TC and current initiatives (extended school day and Scholas), developing detailed action plans for the government to continue promoting coding education; (ii) the bottom-up approach will ensure strong engagement of all beneficiaries (children, families and teachers/school directors) of the program. Teachers who received training will take active roles in the pilot classes to apply and strengthen their knowledge and skills and will also be encouraged to transfer and share their knowledge and experiences with other professionals.

VI. Exceptions to Bank Policy

- 6.1 There are no exceptions to any Bank policies.

VII. Environmental and Social Strategy

- 7.1 The TC is not anticipated to have direct environmental or social impacts and has been classified as "C" according to the Safeguard Classification tool (see [Safeguard Policy Filter Report](#) and [Safeguard Screening Form](#)).

⁹ In this particular case, legislative approval as well as the operational input is required.

Required Annexes:

- Annex I: [Request from the Client and Letters of Commitment](#)
- Annex II: [Results Matrix](#)
- Annex III: [Terms of Reference](#)
- Annex IV: [Procurement Plan](#)



MINISTERIO DE
HACIENDA



Asunción, 8 de junio

de 2018

M.H. N° 766.-

SEÑOR
EDUARDO ALMEIDA, REPRESENTANTE RESIDENTE
BANCO INTERAMERICANO DE DESARROLLO (BID)
ASUNCIÓN, PARAGUAY

Tengo el agrado de dirigirme a usted en ocasión de hacer referencia a la nota N° 292 de fecha 26 de abril del año en curso del Ministerio de Educación y Ciencias, cuya fotocopia se acompaña (Exp M.H. N° 31.696/2018), a través de la cual se solicita las gestiones ante el Banco Interamericano de Desarrollo (BID) para acceder a una cooperación destinada a apoyar las acciones enmarcadas en la Agenda Educativa 2013 – 2018 y el Plan Nacional de Educación 2014.

Al respecto, teniendo en cuenta que la citada operación estará orientada a la implementación de programas de educación digital (TIC) y el plan piloto de un modelo en escuelas de educación escolar básica, además de complementar las acciones encaradas con otros proyectos y programas vigentes, me permito solicitar el apoyo mediante una Cooperación Técnica No Reembolsable que sea administrada por el Banco.

Hago propicia esta oportunidad para saludarle con mi distinguida consideración.



LEA GIMÉNEZ
MINISTRA DE HACIENDA
GOBERNADORA TITULAR POR PARAGUAY

Educación

Tarea de todos
Paraguay Katupyry



TEKOMBO'E
HA TEMBIKUAA
MOTENONDEHA
MINISTERIO DE
EDUCACIÓN
Y CIENCIAS

TETĀ REKUAI
GOBIERNO NACIONAL
Ijajapo hondo rapera ko'ãgo guive,
construyendo el futuro hoy

"SESQUICENTENARIO DE LA EPOPEYA NACIONAL: 1864 - 1870"

Asunción, 26 de abril de 2018

Nota N° 299

Señora Ministra

Ref.: Paraguay/Agenda educativa 2013 - 2018
Solicitud de Apoyo al BID

Me dirijo a usted en el marco del Plan Nacional de Educación 2014 y la Agenda Educativa 2013-2018, Educación tarea de todos, Paraguay Katupyry que busca instalar las TIC en el sistema educativo, para generar las condiciones para que los actores involucrados en el proceso desarrollen capacidades en su manejo para mejorar la calidad de los aprendizajes y preparar a los jóvenes para el mundo digital. En particular, el Ministerio reconoce la importancia de la educación y la introducción a la lógica y el lenguaje de la codificación y la programación para crear nuevas oportunidades para los jóvenes al equiparlos con las competencias fundamentales para el siglo XXI.

En tal sentido, por intermedio de esa Secretaría de Estado, se solicita el apoyo del BID para la concreción de estas iniciativas a través de recursos de cooperación técnica para acompañar el proceso de diseño y definición de mecanismos que permita fortalecer las capacidades de los docentes para implementar programas de educación digital y pilotear un modelo en escuelas de educación escolar básica. Este apoyo es fundamental para el cumplimiento de los objetivos planteados en la agenda Educativa que establece las prioridades en educación para el periodo 2013-2018, así como para la ejecución del programa actualmente en curso con el Banco, Apoyo a la Ampliación de la Jornada Escolar (PR-L1097, y complementa las acciones realizadas en el marco de otros programas vigentes como Scholas (ATN/KP-15013-PR) y educación musical interactiva (ATN/KP-14573-RG) que apoyará el proceso de ampliación de la jornada escolar en Paraguay.

Al agradecer su atención, hago propicia la oportunidad para renovar mis expresiones de consideración y respeto.



Maria del Carmen Giménez Sivulec
Ministra Sustituta

A Su Excelencia
Lea Giménez, Ministra
Ministerio de Hacienda

Despacho del Ministro

15 de Agosto 629 entre Gral. Díaz y E.V. Haedo

Tel: (595 21) 450-014 (595 21) 450-015

Asunción - Paraguay

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LETTER OF COMMITMENT

Dr. Luis Alberto Moreno
President
Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577, USA

June 4, 2018

Subject: Collaboration for Supporting the development of 21st century skills through coding education in Paraguay

Dear Dr. Luis Alberto Moreno,

SK Telecom Co., Ltd. (Hereinafter referred to as "SKT") is pleased to collaborate on the activities of the **Inter-American Development Bank** (Hereinafter referred to as "IDB") related to the program, **"Supporting the development of 21st century skills through coding education in Paraguay"**. This project aims to support Paraguayan youth to develop 21st century skills, such as creativity, computational thinking and problem-solving skills, through coding education. The specific objectives of the program are to: (i) support the implementation of the pilot coding education in selected primary schools; (ii) build capacity of teachers to deliver coding classes; (iii) analyze the effects of coding education on student learning and development of 21st century skills; and (iv) support the development of a public policy on ICT education by contributing to create a shared vision among key stakeholders, and disseminate the results of the project.

As per our previous communication and continued discussion between SKT and IDB, SKT hereby extends its commitment to contribute to this intervention by providing an in-kind contribution valued at USD \$750,000 comprised of:

- 1) Nine hundred (900) Albert Robots, which will be distributed among approximately one hundred (100) treated schools as determined by IDB and the Ministry of Education and Science (MEC) of Paraguay, providing on average nine (9) per treated school;



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- 2) In coordination with the IDB project team members and consultants, provide technical services to adapt existing software applications and/or develop software applications for the Devices in the Spanish language;
- 3) Based on the results from the experimental pilot of the software, collaborate with the IDB team members and consultants to conduct any identified revisions to the software necessary to facilitate teaching and learning;
- 4) Technical assistance in the use and maintenance of the Devices and software applications; and
- 5) In coordination with MEC, provide the services of a technical specialist in Paraguay to provide sufficient training and technical assistance to develop technical capacity in personnel who will work with the Devices.

Communications related to this project will be channeled through the institutional liaisons:
Seongwook Yang: Director of Global Business Development, SKT (goirgio@sk.com) and Mercedes Mateo-Berganza: Education Lead Specialist, Education Division, IDB (mercedesma@iadb.org).

SKT welcomes this opportunity to advance its collaboration with IDB and looks forward to our continued partnership and cooperation. Should you have any further questions, or comments, please contact Mr. Seongwook Yang, Director of Global Business Development at SKT, at goirgio@sk.com.

Sincerely,

A handwritten signature in blue ink, appearing to be "JHP", written over a horizontal line.

Jung Ho Park

CEO

SK Telecom Co., Ltd.



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Daegu, Republic of Korea
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LETTER OF COMMITMENT

Dr. Luis Alberto Moreno
President
Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577, USA

June 08, 2018

Subject: Collaboration for Supporting the development of 21st century skills through coding education in Paraguay

Dear Dr. Luis Alberto Moreno,

The **Korea Education and Research Information Service** (Hereinafter referred to as "KERIS") is pleased to collaborate on the activities of the **Inter-American Development Bank** (Hereinafter referred to as "IDB") related to the program, "**Supporting the development of 21st century skills through coding education in Paraguay**". This project aims to support Paraguayan youth to develop 21st century skills, such as creativity, computational thinking and problem-solving skills, through coding education. The specific objectives of the TC are to: (i) support the implementation of the pilot coding education in selected primary schools; (ii) build capacity of teachers to deliver coding classes; (iii) analyze the effects of coding education on student learning and development of 21st century skills; and (iv) support the development of a public policy on ICT education by contributing to create a shared vision among key stakeholders, and disseminate the results of the project.

As per our previously discussed agreement (MOU/17.07.26) and follow-up communication between KERIS and IDB, KERIS hereby extends its commitment to participate in and contribute to this intervention by providing an in-kind contribution valued at USD \$60,000 by:

1. Providing a teacher/tutor workshop on the best-practices of coding education in Korea (USD \$20,000 covering the travel, lodging, and per diem of Korean experts traveling to Paraguay);
2. Hosting an international conference on ICT education in Paraguay (USD \$20,000 covering the travel, lodging, per diem and honorarium of International speakers and Korean experts traveling to Paraguay);
and
3. Organizing and coordinating a study visit to Korea for Paraguayan officials to engage in policy dialogues and observe coding classes in local schools (USD \$20,000 covering the high-level meeting with Korean experts and policy makers, domestic travel, lodging, per diem of Paraguayan officials).



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Communications related to this project will be channeled through the institutional liaisons: Jeongeun Park: Program Officer, International Initiative and Cooperation Section, KERIS (jepark0220@keris.or.kr) and Mercedes Mateo-Berganza: Education Lead Specialist, Education Division, IDB (mercedesma@iadb.org).

KERIS welcomes this opportunity to advance its collaboration with IDB and looks forward to our continued partnership and cooperation. Should you have any further questions, or comments, please contact Ms. Jeongeun Park, Programme Officer of the International Initiative and Cooperation Section at KERIS, at jepark0220@keris.or.kr.

Sincerely,

A handwritten signature in black ink, appearing to read "Sanghyun Jang", written over a light grey rectangular background.

Sanghyun Jang

~~Director, Academic Information Division~~

Korea Education and Research Information Service (KERIS)

Results Matrix

Outcomes

| Outcome: 1 Improvement in students' cognitive and non-cognitive skills compared to the control group | | | | | | | | | |
|--|--------|--------------------|----------|---------------|-----------------------|------|------|------|------|
| Indicators | Flags* | Unit of Measure | Baseline | Baseline Year | Means of verification | 2018 | 2019 | 2020 | EOP |
| 1.1 Points scored in the test measuring the level of creativity, computational thinking skills, and problem-solving skills | | Standard Deviation | 0.00 | 2018 | | P | 0.00 | 0.00 | 0.12 |
| | | | | | | P(a) | 0.00 | 0.00 | 0.12 |
| | | | | | | A | | | |
| 1.2 Points scored in the standardized math test (EGMA) | | Standard Deviation | 0.00 | 2018 | | P | 0.00 | 0.00 | 0.12 |
| | | | | | | P(a) | 0.00 | 0.00 | 0.12 |
| | | | | | | A | | | |
| 1.3 Points scored in the standardized reading test (EGRA) | | Standard Deviation | 0.00 | 2018 | | P | 0.00 | 0.00 | 0.12 |
| | | | | | | P(a) | 0.00 | 0.00 | 0.12 |
| | | | | | | A | | | |

CRF Indicator

Outputs: Annual Physical and Financial Progress

| 1 Pilot program for coding education in Paraguay | | | | | | Physical Progress | | | | | Financial Progress | | | | | Theme | | | Fund | Flags |
|---|--|-----------------------------|----------|---------------|--|-------------------|------|------|-----|------|--------------------|--------|-------|-----------|-----|-------|--|--|------|-------|
| Outputs | Output Description | Unit of Measure | Baseline | Baseline Year | Means of verification | 2018 | 2019 | 2020 | EOP | 2018 | 2019 | 2020 | EOP | | | | | | | |
| 1.1 Training products developed | Development of a curriculum and lesson plans | Products (#) | 0 | 2018 | Electronic copy of the curriculum and lesson plans uploaded by SCLIEDU on ezShare | P | 0 | 1 | 0 | P | 0 | 100000 | 0 | Education | TBD | | | | | |
| | | | | | | P(a) | 0 | 1 | 0 | P(a) | 0 | 100000 | 0 | | | | | | | |
| | | | | | | A | | | A | | | | | | | | | | | |
| 1.2 Pilot interventions implemented | pilot coding classes provided in schools | Pilots (#) | 0 | 2018 | Electronic copy of the report uploaded by SCLIEDU on ezShare | P | 0 | 1 | 0 | P | 0 | 500000 | 0 | Education | TBD | | | | | |
| | | | | | | P(a) | 0 | 1 | 0 | P(a) | 0 | 500000 | 0 | | | | | | | |
| | | | | | | A | | | A | | | | | | | | | | | |
| 2 Impact evaluation of the pilot program | | | | | | Physical Progress | | | | | Financial Progress | | | | | Theme | | | Fund | Flags |
| Outputs | Output Description | Unit of Measure | Baseline | Baseline Year | Means of verification | 2018 | 2019 | 2020 | EOP | 2018 | 2019 | 2020 | EOP | | | | | | | |
| 2.1 Impact evaluations designed | Report summarizing the design for the impact evaluation | Evaluations (#) | 0 | 2018 | Electronic copy of the report uploaded by SCLIEDU on ezShare | P | 1 | 0 | 0 | P | 0 | 0 | 0 | Education | TBD | | | | | |
| | | | | | | P(a) | 1 | 0 | 0 | P(a) | 0 | 0 | 0 | | | | | | | |
| | | | | | | A | | | A | | | | | | | | | | | |
| 2.2 Experimental impact evaluation (ex-ante or ex-post) performed | Report summarizing the findings from the impact evaluation | Evaluation Final Report (#) | 0 | 2018 | Electronic copy of the report uploaded by SCLIEDU on ezShare | P | 0 | 1 | 1 | P | 0 | 75000 | 75000 | Education | TBD | | | | | |
| | | | | | | P(a) | 0 | 1 | 1 | P(a) | 0 | 75000 | 75000 | | | | | | | |
| | | | | | | A | | | A | | | | | | | | | | | |
| 3 Knowledge sharing, policy design, and dissemination of results | | | | | | Physical Progress | | | | | Financial Progress | | | | | Theme | | | Fund | Flags |
| Outputs | Output Description | Unit of Measure | Baseline | Baseline Year | Means of verification | 2018 | 2019 | 2020 | EOP | 2018 | 2019 | 2020 | EOP | | | | | | | |
| 3.1 Conferences organized | International conference on ICT education in Paraguay and a workshop reporting the final results of the project | Conferences (#) | 0 | 2018 | Electronic copy of reports on the conclusions of the events uploaded by SCLIEDU on ezShare | P | 1 | 0 | 1 | P | 80000 | 0 | 20000 | Education | TBD | | | | | |
| | | | | | | P(a) | 1 | 0 | 1 | P(a) | 80000 | 0 | 20000 | | | | | | | |
| | | | | | | A | | | A | | | | | | | | | | | |
| 3.2 Policy briefs completed | Report providing the blue print and the volumetric analysis of ICT education in Paraguay | Briefs (#) | 0 | 2018 | Electronic copy of report uploaded by SCLIEDU on ezShare | P | 0 | 0 | 1 | P | 0 | 0 | 70000 | Education | TBD | | | | | |
| | | | | | | P(a) | 0 | 0 | 1 | P(a) | 0 | 0 | 70000 | | | | | | | |
| | | | | | | A | | | A | | | | | | | | | | | |
| 3.3 Awareness raising campaigns designed/implemented | Blog articles and video describing the project, highlighting the lessons learned and disseminated through social media | Campaigns (#) | 0 | 2018 | Electronic copy of the blog articles and video uploaded by SCLIEDU on ezShare | P | 0 | 0 | 1 | P | 0 | 0 | 30000 | Education | TBD | | | | | |
| | | | | | | P(a) | 0 | 0 | 1 | P(a) | 0 | 0 | 30000 | | | | | | | |
| | | | | | | A | | | A | | | | | | | | | | | |

Other Cost

Total Cost

CRF Indicator

Standard Output Indicator

| | 2018 | 2019 | 2020 | Total Cost |
|------|-------------|--------------|--------------|--------------|
| P | \$80,000.00 | \$675,000.00 | \$195,000.00 | \$950,000.00 |
| P(a) | \$80,000.00 | \$675,000.00 | \$195,000.00 | \$870,000.00 |
| A | | | | |

TERMS OF REFERENCE

Implementation of Pilot Program for Coding Education in Paraguay

PARAGUAY

PR-T1245

SUPPORTING THE DEVELOPMENT OF 21ST CENTURY SKILLS THROUGH CODING EDUCATION

1. Background and Justification

- 1.1.** Established in 1959, the Inter-American Development Bank (“IDB” or “Bank”) is the main source of financing for economic, social and institutional development in Latin America and the Caribbean. It provides loans, grants, guarantees, policy advice and technical assistance to the public and private sectors of its borrowing countries.
- 1.2.** In today’s society in which information and communication technology (ICT) pervades virtually every aspect of our life and work, digital literacy plays a vital role in defining a student’s ability to thrive both during and beyond school. Students unable to navigate through the complex digital world will no longer be able to fully participate in the rapidly changing economic, social and cultural landscape (OECD 2015). In particular, coding/programming education can create new opportunities for youth by equipping them with the knowledge and skills necessary for the information age, commonly referred to as the 21st century skills, such as creativity, computational thinking and problem-solving skills.
- 1.3.** To support student learning, the Paraguayan government has strived to harness the power of ICTs. In 2009, the Paraguayan Ministry of Education and Culture (MEC) established the Policy for the Incorporation of ICT in the Education System with the support of the IDB. The policy aimed to “contribute to the improvement of education through the use of ICT and support all students to develop digital competencies necessary to participate and actively contribute in society” (MEC, 2009). The National Education Plan 2024 and Educational Agenda 2013-2018 also place specific emphasis on the use of ICT in teaching and school management to improve access to and quality of education. In particular, funding allocations illustrate the Paraguayan government’s commitment to improve student learning outcomes by incorporating ICT in classrooms. In 2012, the government increased education funding through Law 4.758, creating the National Public Investment and Development Fund (FONACIDE). The largest component of FONACIDE was improving learning conditions by harnessing ICTs (USD 145 million) (MEC, 2012).
- 1.4.** While Paraguay has established a policy framework, allocated budget for ICT infrastructure and expanded access to computers, content development and teacher training remain a critical task before implementing coding education. Only 7% of teachers received training in the pedagogical use of ICT and 7% of the teachers reported to use

the computer (MEC, 2013). In order to take full advantage of the increased access to computers, Paraguay needs to now focus on developing content and strengthening teacher ICT capacity to provide well-designed coding education that can effectively improve student academic performance and support students to develop 21st century skills.

1.5. Against this background, the Ministry of Education in Paraguay and the IDB have joined forces to implement experimental coding classes for 2000 1st graders and teacher training for 100 teachers and 500 teaching assistants (8th graders) across 100 elementary schools in Paraguay. The contracting firm/organization will assist with the implementation process.

2. Objectives

2.1. The objective of the consultancy is to implement the pilot intervention ensuring: the hiring and training of master tutors, training of teachers/teaching assistants, deployment of the program in 100 pilot schools, and the monitoring of intervention for its effective implementation.

3. Scope of Services

3.1. The beneficiaries include 2000 1st graders, 100 1st grade teachers, and 500 teaching assistants (8th graders) across 100 pilot schools in Paraguay.

4. Key Activities

4.1. The consulting firm will work in close collaboration with the Ministry of Education and Science in Paraguay, conducting following activities without prejudice to other tasks that are necessary to complete the work:

- (i) Develop and submit a first draft of a detailed work plan for the consultancy, including the description of the activities to be carried out and its products, a schedule of activities and deliverables.
- (ii) Develop two separate training programs, one for the 20 master tutors and the other for the master tutors to train the teachers and teaching assistants. The materials will include: lesson plans for the training of master tutors, teachers, and teaching assistants, and master tutors' guide. The training program should be designed to deliver a minimum of 40 training hours including classroom practices.
- (iii) Recruit, hire, and train 20 master tutors who will later train teachers and teaching assistants.
- (iv) Have the master tutors train 100 1st grade teachers and 500 teaching assistants (8th graders) in 20 different locations across Paraguay, and supervise and support their training.
- (v) Manage the intervention and keep the quality controlled by paying monthly visits to the pilot schools during the implementation.

5. Expected Outcome and Deliverables

5.1. The consultancy will deliver the following documents and reports:

- (i) Product 1: Inception report, including work plan
- (ii) Product 2: Report on the development of two training programs
- (iii) Product 3: Report on the recruitment, hiring, and training of 20 master tutors and the training of teachers and teaching assistants
- (iv) Product 4: Report on the monitoring of the intervention, including the findings from the monthly school visits
- (v) Product 5: Final report on the implementation of the pilot, including the lessons learned and the database on the beneficiaries' participation in the training and the coding classes

6. Project Schedule and Milestones

- (i) Product 1: Workplan of the consultancy, including the dates and responsibilities for training and managing the implementation in two weeks after signing the contract
- (ii) Product 2 & 3: Relevant reports submitted in three months after delivering Product 1
- (iii) Product 4: Monitoring report submitted in a month after the last school visit
- (iv) Product 5: The final report in a month after the completion of the pilot program

7. Reporting Requirements

7.1. The firm will be required to provide biweekly email updates on the progress of the work. All materials produced during and for this consultancy will:

- (i) Be delivered in hard and electronic copies (Zip files won't be accepted as final reports);
- (ii) Be owned by the IDB (copyright), including the right to produce, distribute, disseminate and publish, notwithstanding the termination of the consultancy.

8. Acceptance Criteria

8.1. The project Team Leader is responsible for the approval of the products delivered by the firm/organization.

9. Other Requirements

9.1. The firm/organization should have a prominent trajectory in the development of education projects, with an emphasis on the use of ICT in education. It should promote an education vision that is holistic with a special focus on integration of vulnerable populations. In addition, the organization should have the leverage and international recognition as proven by already existing and previously established partnerships with other international organizations, NGOs,

Foundations, etc. The organization should have a team of highly qualified professionals and experts in the fields of education, innovation, and project management in developing countries.

10. Supervision and Reporting

10.1. All reports will require an approval by the project Team Leader. It shall be Firm's responsibility for ensuring that all reports are submitted to the Bank.

11. Schedule of Payments

11.1. Payments will be made as the following:

| Payment Schedule | |
|------------------------------|----------|
| <i>Deliverable</i> | % |
| 1. Upon signing the contract | 20 % |
| 2. Product 1, 2, & 3 | 30 % |
| 3. Product 4 | 25 % |
| 4. Product 5 | 25 % |
| TOTAL | 100% |

TERMS OF REFERENCE

Development of Curriculum for the Pilot Coding Classes in Paraguay

PARAGUAY

PR-T1245

SUPPORTING THE DEVELOPMENT OF 21ST CENTURY SKILLS THROUGH CODING
EDUCATION

1. Background and Justification

1.1. Established in 1959, the Inter-American Development Bank ("IDB" or "Bank") is the main source of financing for economic, social and institutional development in Latin America and the Caribbean. It provides loans, grants, guarantees, policy advice and technical assistance to the public and private sectors of its borrowing countries.

1.2. In today's society in which information and communication technology (ICT) pervades virtually every aspect of our life and work, digital literacy plays a vital role in defining a student's ability to thrive both during and beyond school. Students unable to navigate through the complex digital world will no longer be able to fully participate in the rapidly changing economic, social and cultural landscape (OECD 2015). In particular, coding/programming education can create new opportunities for youth by equipping them

with the knowledge and skills necessary for the information age, commonly referred to as the 21st century skills, such as creativity, computational thinking and problem-solving skills.

- 1.3.** To support student learning, the Paraguayan government has strived to harness the power of ICTs. In 2009, the Paraguayan Ministry of Education and Culture (MEC) established the Policy for the Incorporation of ICT in the Education System with the support of the IDB. The policy aimed to “contribute to the improvement of education through the use of ICT and support all students to develop digital competencies necessary to participate and actively contribute in society” (MEC, 2009). The National Education Plan 2024 and Educational Agenda 2013-2018 also place specific emphasis on the use of ICT in teaching and school management to improve access to and quality of education. In particular, funding allocations illustrate the Paraguayan government’s commitment to improve student learning outcomes by incorporating ICT in classrooms. In 2012, the government increased education funding through Law 4.758, creating the National Public Investment and Development Fund (FONACIDE). The largest component of FONACIDE was improving learning conditions by harnessing ICTs (USD 145 million) (MEC, 2012).
- 1.4.** While Paraguay has established a policy framework, allocated budget for ICT infrastructure and expanded access to computers, content development and teacher training remain a critical task before implementing coding education. Only 7% of teachers received training in the pedagogical use of ICT and 7% of the teachers reported to use the computer (MEC, 2013). In order to take full advantage of the increased access to computers, Paraguay needs to now focus on developing content and strengthening teacher ICT capacity to provide well-designed coding education that can effectively improve student academic performance and support students to develop 21st century skills.
- 1.5.** Against this background, the Ministry of Education in Paraguay and the IDB have joined forces to implement coding education in 100 pilot schools. The contracting firm/organization will assist with the development of a curriculum and lesson plans for the coding classes in pilot schools.

2. Objectives

- 2.1.** The objective of the consultancy is to develop a semester long curriculum of coding classes for 1st graders in Paraguay.

3. Key Activities

- 3.1.** The firm/organization will work in close collaboration with the Ministry of Education and Science in Paraguay and the project team of the Bank (SCL/EDU), conducting following activities without prejudice to other tasks that are necessary to complete the work:

- (i) Draft and submit a detailed work plan for the consultancy, including the description of the activities to be carried out and its products, a schedule of activities and deliverables.
- (ii) Develop a semester long curriculum of coding classes for the 1st graders. The curriculum holds 20 lessons and is a mixture of unplugged and classes utilizing a coding robot. The curriculum comes with a teachers' guide that details lesson plans. Each lesson covers a 45-minute long coding class for 1st graders, and the lesson plan identifies the objectives of the class, outlines the main activities (individual vs. group/unplugged vs. coding robot), and introduces the evaluation method. In the annex, all the developed materials including the activity and evaluation worksheets will be attached and they need to be contextualized and culturally relevant to keep the 1st graders engaged and motivated.

4. Expected Outcome and Deliverables

4.1. The consultancy will deliver the following documents and reports:

- (i) Product 1: Inception report, including work plan
- (ii) Product 2: Report on the development of curriculum, lesson plans, teachers' guide, and teaching/learning materials and the submission of all materials developed
- (iii) Product 3: Final report on the implementation of the consultancy

5. Project Schedule and Milestones

- (i) Product 1: Workplan of the consultancy (in two weeks after signing the contract).
- (ii) Product 2: Report and the developed materials (by the end of the third month).
- (iii) Product 3: Final report (by the end of the fifth month).

6. Reporting Requirements

6.1. The firm will be required to provide biweekly email updates on the progress of the work. All materials produced during and for this consultancy will:

- (i) Be delivered in hard and electronic copies (Zip files won't be accepted as final reports).
- (ii) Be owned by the IDB (copyright), including the right to produce, distribute, disseminate and publish, notwithstanding the termination of the consultancy.

7. Acceptance Criteria

7.1. The project Team Leader is responsible for the approval of the products delivered by the firm/organization. They are subject to revisions upon the request of the Bank to ensure high-quality implementation.

8. Other Requirements

8.1. The firm/organization should have a prominent trajectory in the development of education

materials, with an emphasis on coding education or the ICT education at large. It needs to design and offer a curriculum that aligns with the new educational vision developed for the ICT education in the country with a special focus on integration of vulnerable populations. In addition, the organization should have the leverage and international recognition as proven by the previously established partnerships with other international organizations, NGOs, Foundations, etc. The organization should be equipped with a team of highly qualified professionals and experts in the fields of education, technology, and project management in developing countries.

9. Supervision and Reporting

9.1. All reports will require an approval by the project Team Leader. It shall be firm's responsibility for ensuring that all reports are submitted to the Bank.

10. Schedule of Payments

| Payment Schedule | |
|------------------------------|-------------|
| <i>Deliverable</i> | % |
| 1. Upon signing the contract | 20 |
| 2. Product 1 | 20 |
| 3. Product 2 | 40 |
| 4. Product 3 | 20 |
| TOTAL | 100% |

TERMS OF REFERENCE

Impact Evaluation of the Pilot Coding Education in Paraguay

PARAGUAY

PR-T1245

SUPPORTING THE DEVELOPMENT OF 21ST CENTURY SKILLS THROUGH CODING
EDUCATION

1. Background and Justification

- 1.1.** Established in 1959, the Inter-American Development Bank ("IDB" or "Bank") is the main source of financing for economic, social and institutional development in Latin America and the Caribbean. It provides loans, grants, guarantees, policy advice and technical assistance to the public and private sectors of its borrowing countries.
- 1.2.** In today's society in which information and communication technology (ICT) pervades virtually every aspect of our life and work, digital literacy plays a vital role in defining a student's ability to thrive both during and beyond school. Students unable to navigate through the complex digital world will no longer be able to fully participate in the rapidly

changing economic, social and cultural landscape (OECD 2015). In particular, coding/programming education can create new opportunities for youth by equipping them with the knowledge and skills necessary for the information age, commonly referred to as the 21st century skills, such as creativity, computational thinking and problem-solving skills.

1.3. To support student learning, the Paraguayan government has strived to harness the power of ICTs. In 2009, the Paraguayan Ministry of Education and Culture (MEC) established the Policy for the Incorporation of ICT in the Education System with the support of the IDB. The policy aimed to “contribute to the improvement of education through the use of ICT and support all students to develop digital competencies necessary to participate and actively contribute in society” (MEC, 2009). The National Education Plan 2024 and Educational Agenda 2013-2018 also place specific emphasis on the use of ICT in teaching and school management to improve access to and quality of education. In particular, funding allocations illustrate the Paraguayan government’s commitment to improve student learning outcomes by incorporating ICT in classrooms. In 2012, the government increased education funding through Law 4.758, creating the National Public Investment and Development Fund (FONACIDE). The largest component of FONACIDE was improving learning conditions by harnessing ICTs (USD 145 million) (MEC, 2012).

1.4. While Paraguay has established a policy framework, allocated budget for ICT infrastructure and expanded access to computers, content development and teacher training remain a critical task before implementing coding education. Only 7% of teachers received training in the pedagogical use of ICT and 7% of the teachers reported to use the computer (MEC, 2013). In order to take full advantage of the increased access to computers, Paraguay needs to now focus on developing content and strengthening teacher ICT capacity to provide well-designed coding education that can effectively improve student academic performance and support students to develop 21st century skills.

1.5. Against this background, the Ministry of Education in Paraguay and the IDB have joined forces to implement pilot coding classes for 2000 1st graders led by 100 teachers and 500 teaching assistants (8th graders) across 100 schools in Paraguay. The contracting firm will assist with the experimental impact evaluation of the pilot program, including the data collection at the baseline and the end line after the implementation.

2. Objectives

2.1. The objective of the consultancy is to assist with the impact evaluation of the pilot program collecting the baseline and the end line data in the treatment (100 schools) and control (100 schools) groups.

3. Scope of Services

3.1. The baseline and end line data collection has to be performed in: 200 schools (100 in treatment and 100 in control); 4000 1st graders (2000 in each group); and 1000 8th graders (500 in each group) in Paraguay.

4. Key Activities

4.1. The key activities include, but are not limited to the following:

- (i) For the baseline data collection, design the workplan and timeline.
- (ii) Adjust and revise the data collection instrument (quantitative and qualitative).
- (iii) Select and recruit a project director, supervisors, fieldwork coordinators, and interviewers/enumerators.
- (iv) Organize a training for supervisors, fieldwork coordinators, and interviewers/enumerators.
- (v) Organize school visits for data collection.
- (vi) Prepare a digitized database that includes detailed information by school and ensure the consistency of the data.
- (vii) Deliver complete database in the STATA format, codebook and submit the final report with preliminary results.
- (viii) Repeat the cycle from (i) to (vii) for the collection and analysis of the end line data.

5. Expected Outcome and Deliverables

5.1. For the collection of baseline data,

- Product 1: Inception report, including work plan and the revised instrument
- Product 2: Report on the recruitment and training of staff
- Product 3: Complete database in the STATA format, codebook, and the final report with preliminary analysis

5.2. For the collection of end line data,

- (i) Product 4: Inception report, including work plan and the revised instrument
- (ii) Product 5: Report on the recruitment and training of staff
- (iii) Product 6: Complete database in the STATA format, codebook, and the final report with preliminary analysis

6. Project Schedule and Milestones

6.1. Product 1: Workplan and the revised instrument in two weeks after signing the contract

6.2. Product 2: Report submitted in a month after the submission of product 1

6.3. Product 3: Database and the report submitted in a month after the data collection of the baseline

6.4. Product 4: Workplan and the revised instrument in two weeks after the completion of the intervention

6.5. Product 5: Report submitted in a month after the submission of product 4

6.6. Product 6: Database and the report submitted in a month after the data collection of the end line

6.7. The following chart represents the cycle of data collection that should be followed both at baseline and end line collection.

| Activities | Weeks | | | | | | | |
|---|-------|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <i>Milestone 1° Activities for data collection in the field</i> | | | | | | | | |
| Meeting with MEC and IDB counterparts for adjustments to the work plan and final co-ordination. | ■ | | | | | | | |
| Review and adjustment of the questionnaire, elaboration of filling instructions for interviewers, verifiers and monitors, protocols of confidentiality. | ■ | ■ | | | | | | |
| Call and pre-selection of personnel | ■ | ■ | | | | | | |
| Planning of sample distribution and workload by local team and interviewer | ■ | ■ | | | | | | |
| Design of data entry platform | | ■ | ■ | | | | | |
| Training and final selection of interviewers | | | ■ | | | | | |
| Pilot questionnaire with interviewers | | | ■ | | | | | |
| organize work field materils | | | ■ | | | | | |
| <i>Milestone 2°: Activities related to questionnaire application</i> | | | | | | | | |
| Data collection | | | | ■ | ■ | | | |
| Fieldwork monitoring | | | | ■ | ■ | | | |
| Daily verification of survey application | | | | ■ | ■ | | | |
| Digitalization of the surveys carried out | | | | ■ | ■ | ■ | | |
| <i>Milestone 3°: Database and final report</i> | | | | | | | | |
| Formatting of the database in STATA. | | | | | | ■ | ■ | |
| Delivery of final report and database | | | | | | | | ■ |

7. Reporting Requirements

7.1. The firm will deliver a codebook in STATA and a final report with preliminary results of the data collected.

8. Acceptance Criteria

8.1. The project Team Leader is responsible for the approval of the products delivered by the firm/organization.

9. Supervision and Reporting

9.1. The firm/organization will closely collaborate all the activities mentioned in this TOR with the project Team Leader assigned to this consultancy.

10. Schedule of Payments

10.1. Payments will be made as the following:

| Payment Schedule | |
|------------------------------|------|
| <i>Deliverable</i> | % |
| 1. Upon signing the contract | 20 % |
| 2. Product 1 & 2 | 10 % |
| 3. Product 3 | 30 % |
| 4. Product 4 & 5 | 10 % |
| 5. Product 6 | 30 % |
| TOTAL | 100% |

TERMS OF REFERENCE

*Individual Consultant for the Volumetric Analysis of
Nationwide Implementation of ICT Education in Paraguay*

PARAGUAY

PR-T1245

*SUPPORTING THE DEVELOPMENT OF 21ST CENTURY SKILLS THROUGH CODING
EDUCATION*

1. Background and Justification

- 1.1.** Established in 1959, the Inter-American Development Bank (“IDB” or “Bank”) is the main source of financing for economic, social and institutional development in Latin America and the Caribbean. It provides loans, grants, guarantees, policy advice and technical assistance to the public and private sectors of its borrowing countries.
- 1.2.** In today’s society in which information and communication technology (ICT) pervades virtually every aspect of our life and work, digital literacy plays a vital role in defining a student’s ability to thrive both during and beyond school. Students unable to navigate through the complex digital world will no longer be able to fully participate in the rapidly changing economic, social and cultural landscape (OECD 2015). In particular, coding/programming education can create new opportunities for youth by equipping them with the knowledge and skills necessary for the information age, commonly referred to as the 21st century skills, such as creativity, computational thinking and problem-solving skills.
- 1.3.** To support student learning, the Paraguayan government has strived to harness the power of ICTs. In 2009, the Paraguayan Ministry of Education and Culture (MEC) established the Policy for the Incorporation of ICT in the Education System with the support of the IDB. The policy aimed to “contribute to the improvement of education through the use of ICT and support all students to develop digital competencies necessary to participate and actively contribute in society” (MEC, 2009). The National

Education Plan 2024 and Educational Agenda 2013-2018 also place specific emphasis on the use of ICT in teaching and school management to improve access to and quality of education. In particular, funding allocations illustrate the Paraguayan government's commitment to improve student learning outcomes by incorporating ICT in classrooms. In 2012, the government increased education funding through Law 4.758, creating the National Public Investment and Development Fund (FONACIDE). The largest component of FONACIDE was improving learning conditions by harnessing ICTs (USD 145 million) (MEC, 2012).

1.4. While Paraguay has established a policy framework, allocated budget for ICT infrastructure and expanded access to computers, content development and teacher training remain a critical task before implementing coding education. Only 7% of teachers received training in the pedagogical use of ICT and 7% of the teachers reported to use the computer (MEC, 2013). In order to take full advantage of the increased access to computers, Paraguay needs to now focus on developing content and strengthening teacher ICT capacity to provide well-designed coding education that can effectively improve student academic performance and support students to develop 21st century skills.

1.5. Against this background, the Ministry of Education in Paraguay and the IDB have joined forces to support the implementation of the strategy for ICT education. The consultant will develop a blueprint and the volumetric analysis for the nationwide implementation of ICT education in Paraguay.

2. Objectives

2.1. The objective of the consultancy is to develop a blueprint and the volumetric analysis required for the national implementation of ICT education in Paraguay.

3. Key Activities

3.1. The individual consultant will work in close collaboration with the Ministry of Education and Science in Paraguay and the project team (SCL/EDU), conducting following activities without prejudice to other tasks that are necessary to complete the work:

- (i) Draft and submit a workplan and timeline.
- (ii) Develop a blueprint and the volumetric analysis of national implementation of ICT education in Paraguay. The report will include sections on: a) the current status and the action plans that detail the inputs (hardware and software) necessary to realize the vision on ICT education set at the national and institutional level in Paraguay; and b) the volumetric analysis that estimates the cost to establish ICT infrastructure with appropriate hardware and connectivity.

4. Expected Outcome and Deliverables

4.1. The consultancy will deliver the following documents and reports:

- (i) Product 1: Inception report, including work plan and timeline
- (ii) Product 2: First progress report covering section a)
- (iii) Product 3: Second progress report covering section b)
- (iv) Product 4: Final report completing all sections

5. Project Schedule and Milestones

- (i) Product 1: Workplan of the consultancy (in two weeks after signing the contract.
- (ii) Product 2: First progress report (in a month after product 1)
- (iii) Product 3: Second progress report (in a month after product 2)
- (iv) Product 4: The final report (in a month after product 3)

6. Reporting Requirements

6.1. The consultant will be required to provide biweekly email updates on the progress of the work. All materials produced during and for this consultancy will:

- (i) Be delivered in hard and electronic copies (Zip files won't be accepted as final reports);
- (ii) Be owned by the IDB (copyright), including the right to produce, distribute, disseminate and publish, notwithstanding the termination of the consultancy

7. Acceptance Criteria

7.1. The project Team Leader is responsible for the approval of the products delivered by the firm/organization. They are subject to revisions upon the request of the Bank to ensure high-quality implementation.

8. Other Requirements

- 8.1.** Education: Advanced degrees in Technology, Engineering, or a related field.
- 8.2.** Experience: Minimum ten years of professional experience in consulting governments on the ICT related reforms and policies.
- 8.3.** Language: Excellent command in Spanish. English is preferred.

9. Supervision and Reporting

9.1. All reports will require an approval by the project Team Leader. It shall be the consultant's responsibility for ensuring that all reports are submitted to the Bank.

10. Schedule of Payments

10.1. Payments will be made as the following:

| Payment Schedule | |
|--------------------|------|
| <i>Deliverable</i> | % |
| 1. Product 1 | 25 |
| 2. Product 2 | 25 |
| 3. Product 3 | 25 |
| 4. Product 4 | 25 |
| TOTAL | 100% |

| PROCUREMENT PLAN FOR IDB-EXECUTED OPERATIONS | | | | | | | | | | | | | | |
|--|-----------------------------|--------------------------------|--|-----------------------------------|----------------------------|--|---------------------------------------|------|----------------------|----|--|-------------------------------------|------------------------------|----------|
| Country: Paraguay | | | | | | Executing Agency: IDB | | | | | | UDR: SCL/EDU | | |
| Project number: PR-T1245 | | | | | | Project name: Supporting the development of 21st century skills through coding education | | | | | | | | |
| Period covered by the Plan: [36 months] | | | | | | Total Project Amount: \$ 950,000 | | | | | | | | |
| Component | Procurement Type (1) (2) | Service type (1) (2) | Description | Estimated contract cost (US\$) | Selection Method (2) | Type of Contract | Source of Financing and Percentage | | | | Estimated date of the procurement notice | Estimated contract start date | Estimated contract length | Comments |
| | | | | | | | IDB/MIF | | Other External Donor | | | | | |
| | | | | | | | Amount | % | Amount | % | | | | |
| Component 1 | A. Consulting services | Consulting Firm (GN-2765) | The contracted organization will hire and train master tutors, train teachers/teaching assistants, and manage 100 pilot schools during the project implementation. | \$ 400,000 | SSS | Lump Sum | \$ 400,000 | 100% | \$ - | 0% | 15-Oct-18 | 1-Dec-18 | 12 months | |
| Component 1 | A. Consulting services | Consulting Firm (GN-2765) | The contracted organization will develop a curriculum for coding education and provide lesson plans | \$ 100,000 | SCS | Lump Sum | \$ 100,000 | 100% | \$ - | 0% | 15-Oct-18 | 15-Nov-18 | 6 months | |
| Component 2 | A. Consulting services | Consulting Firm (GN-2765) | Impact Evaluation | \$ 150,000 | SSS | Lump Sum | \$ 150,000 | 100% | \$ - | 0% | 15-Dec-18 | 1-Feb-19 | 12 months | |
| Component 3 | A. Consulting services | Individual Consultant (AM-650) | The contracted individual can provide a report that presents a blueprint or the volumetric analysis for the nationwide implementation in Paraguay | \$ 70,000 | ICQ | Lump Sum | \$ 70,000 | 100% | \$ - | 0% | 1-Nov-19 | 1-Jan-20 | 3 months | |
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| Prepared by: | Changha Lee | | TOTALS | \$ 720,000 | | | Total should equ | 100% | \$ - | 0% | | | | |
| (1) Grouping together of similar procurement is recommended, such as publications, travel, etc. If there are a number of similar individual contracts to be executed at different times, they can be grouped together under a single heading with an explanation in the comments column indicating the average individual amount and the period during which the contract would be executed. For example: an export promotion project that includes travel to participate in fairs would have an item called "airfare for fairs", an estimated total value od US\$5,000, and an explanation in the Comments column: "This is for approximately four different airfares to participate in fairs in the region in years X and X1". | | | | | | | | | | | | | | |
| (2) (i) Individual consultants: ICQ: Individual Consultant Selection Based on Qualifications; SSS: Single Source Selection. Selection process to be done in accordance with AM-650. | | | | | | | | | | | | | | |
| (2) (ii) Consulting firms: Per GN-2765-1, Consulting Firm selection methods for Bank-executed Operations are: Single Source Selection (SSS); Simplified Competitive Selection (<=250K) (SCS); Fully Competitive (>250K) (FCS); and Framework Agreement Task Order (TO). All Consulting Firm selection processes under this policy must use the electronic module in Convergence. | | | | | | | | | | | | | | |
| (2) (iii) Goods: Per GN-2765-1, par. A.2.2.c: "The procurement of goods and related services, except when such goods and related services are necessary to achieve the objectives of the Bank-executed Operational Work and are included in the consulting services contract and represent less than ten percent (10%) of the consulting services contract value." | | | | | | | | | | | | | | |