

TC Document

I. Basic Information for TC

▪ Country/Region:	URUGUAY
▪ TC Name:	High Touch High Tech: Teachers and Artificial Intelligence building an enhanced response to COVID emergency by fostering knowledge and skills
▪ TC Number:	UR-T1244
▪ Team Leader/Members:	Perez Alfaro, Marcelo A. (SCL/EDU) Team Leader; Arias Ortiz, Elena (SCL/SCL) Alternate Team Leader; Blasco, Ivana (SCL/EDU); Holguin Madrinan, Alejandra (SCL/SCL); Magrassi, Maria Jimena (CSC/CUR); Mendoza Benavente, Horacio (LEG/SGO); Scannone Chavez, Rodolfo Andres (SCL/EDU); Tournier Vazquez, Valentina (CSC/CUR)
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	.
▪ Date of TC Abstract authorization:	15 May 2020.
▪ Beneficiary:	Centro Ceibal
▪ Executing Agency and contact name:	Centro Ceibal
▪ Donors providing funding:	Korea Poverty Reduction Fund(KPR)
▪ IDB Funding Requested:	US\$800,000.00
▪ Local counterpart funding, if any:	US\$80,000.00 (Cash)
▪ Disbursement period (which includes Execution period):	24 months
▪ Required start date:	August 1st, 2020
▪ Types of consultants:	Firms and individual consultants
▪ Prepared by Unit:	SCL/EDU-Education
▪ Unit of Disbursement Responsibility:	CSC/CUR-Country Office Uruguay
▪ TC included in Country Strategy (y/n):	Yes
▪ TC included in CPD (y/n):	Yes
▪ Alignment to the Update to the Institutional Strategy 2010-2020:	Social inclusion and equality

II. Objectives and Justification of the TC

- II.1 The objectives of the TC are: (i) to support the CEIBAL's educational response to the challenges emerging from the COVID 19 pandemic; (ii) to develop and implement innovative pedagogical approaches with tele-edu technology for mathematics and computational thinking (CT), using High Touch – High Tech (HT-HT) strategies; (iii) to generate evidence about the results and impact of HT-HT strategies both in math learning outcomes and CT skills; and (iv) to generate operational knowledge about the implementation of both pilots.
- II.2 **CEIBAL and COVID response.** Uruguay closed the schools on March 10th. Since school closure, CEIBAL is at the forefront of education continuity, by digital means. The number of users soared and CEIBAL adapted their platforms and contents to the new situation. The number of teachers and students who registered entries to the learning management system has quadrupled compared to before the pandemic; more than 75% of the students and more than 84% of the teachers connected to the platform. However, there is still an income gap in the access to the resources, although smaller than in other countries: the gap in the access to CEIBAL's learning

management system¹ (CREA) between students of quintile 1 and 5 is 22%. Uruguay designed a progressive strategy to reopen schools, beginning with schools serving vulnerable populations and students in their last year of secondary education, ending with the opening of all country schools by the end of June.²

- II.3 The National Public Education Administration (ANEP), is an autonomous agency responsible for public basic education delivery in Uruguay at the preschool, primary, secondary, and vocational school levels, as well as teacher training. Since 2007, CEIBAL has become the engine for introducing new information and communication technologies for the innovation of the educational system. Uruguay has made progress in its ability to monitor and evaluate the quality of services and educational trajectories. The educational information and management systems (SIGED) of ANEP (National Public Education Administration) enable the tracking of the trajectory of each child who attends an initial or basic education center, have agile applications for communication with parents and automatic enrollment mechanisms for the transition of initial to Primary and from Primary to Secondary education/school.
- II.4 **CEIBAL and its evolution process.** Apart from providing access to digital devices (2007- 2009), CEIBAL fosters their use in the classroom by deploying educational platforms - Digital Library, learning management systems, CEIBAL in English (CEI), and Online Learning Appraisal System (SEA) - creating digital educational content, and training teachers (2010-2012). Since 2013, CEIBAL emphasizes the use of technologies to leverage new teaching methods, transform teaching practices by integrating devices and new resources into the learning process and strengthening CEIBAL's assessment capacities. The challenges for the future are: (i) maintain the high level of use of the various resources/platforms over time; (ii) integrate them effectively to consolidate their contribution to transforming the pedagogical process by fostering deep learning strategies such as working on interdisciplinary projects connected to real life and student interests; (iii) promoting cross-cutting competencies considered essential for 21st century citizens fostered by the New Pedagogies for Deep Learning carried out by CEIBAL (creativity, collaboration, citizenship, communication, critical thinking, and character), deploying strategies explicitly designed to foster and shape these competencies³; and (iv) promote research and knowledge transfer to support decision-making by the education system's various actors. CEIBAL's track record - from closing the digital gap to this new focus on developing the maximum potential for learning, creativity, and critical thought in Uruguayan children and adolescents - has consolidated the institution's pioneer status both within and beyond the region.
- II.5 **CEIBAL and Math Platforms.** CEIBAL has provided the education system with two main tools to promote the learning of Mathematics. On the one hand, the Adaptive Mathematics Platform (PAM), is an online adaptive learning tool. PAM's content has been adapted to the national curriculum, offering more than 100,000 activities to students from the 3rd grade of Primary school through 3rd grade of Secondary education. It is an adaptative platform, in two senses, because it allows students to obtain personalized feedback according to each student's level, but also adapts to the

¹ CEIBAL's monitoring reports.

² https://medios.presidencia.gub.uy/tav_portal/2020/noticias/AG_283/Vuelta%20a%20clases.pdf

³ Integran NPDL siete países (Canadá, Estados Unidos, Holanda, Nueva Zelanda, Australia, Finlandia y Uruguay). Cobo, C., Brovetto, C., y Gago, F, Global Network for Deep Learning: The Case of Uruguay (2016).

teacher's needs, allowing each student to be assigned a series of problems according to their own progress. A recent study shows a positive effect of the use of PAM on mathematic scores. And it also shows that the impacts of PAM increase as the socioeconomic status decreases (Aboal & Perera, 2018). On the other hand, Matific is a game-based platform that complements the use of PAM, focusing on younger students (5-12 years old). Matific is a collection of online math activities that encourage learning using game-oriented activities. It also allows teachers to keep performance reports for each of their students.

- II.6 **CEIBAL and CT.** Currently, the implementation of Plan CEIBAL is characterized by the development of new programs based on digital skills, 21st century skills such as CT, New Pedagogies for Deep Learning (NPDL), First Lego League (robotics competition), the teaching of coding as a cross curricular subject, research on learning analytics, adaptive evaluation system, among others. Since 2018, Plan CEIBAL has developed a program for teaching CT from 4th to 6th grade in primary schools. The program went from 500 groups in 2018, to 1600 groups in 2019, aiming to reach 3000 groups in 2020. This program seeks to promote logical mathematical thinking, creativity, innovation, and problem solving through CT. The program follows a curriculum created by CEIBAL and the Sadosky Foundation⁴ and requires a remote teacher specialized in CT that has an hourly class every week with the students and classroom teacher.
- II.7 **Challenges of Uruguay's education system: Learning, curricula, and educational track record.** The main challenge of the education system is improving the quality of education in the country. According to the last edition of the Program for International Student Assessment (PISA), Uruguay shows some progress, which ranks near the top of LAC countries, but is still a considerable distance from the OECD average⁵. In mathematics, Uruguayan students obtained 418 points, maintaining the results of the 2015 edition. This score is the highest in the region (as well as Chile). In reading, there was a slight decrease in the results from 2015 to 2018 (from 437 points to 427), placing Uruguay below Chile and slightly above Costa Rica and Mexico. In science, Uruguay reached an average score of 426 points in 2018, which represented a drop compared to 2015 results, ranking second in Latin America. In 2018, 51% of Uruguayan students had low levels of performance in mathematics, 41.9% in reading and 43.9% in science, compared to 52%, 31.7% and 35.3% of Chilean students, respectively. PISA also shows learning gaps by socioeconomic level, equivalent to 2.8 years of schooling, one of the largest in the region. In addition to the low learning levels, secondary school curricula adopt a classic approach focused on discipline and characterized by many subjects. Therefore, the educational offering is not attractive enough to young people, as reflected in the high percentage of youngsters who fail to complete secondary school: barely 38% of Uruguayans between 18 and 20 years of age have completed all 12 years of compulsory education. This compares to an average secondary-school graduation rate of 43.1% for the region and 80.2% for Chile, a country like Uruguay in terms of income⁶. Household surveys show that the lack of

⁴ <http://www.fundacionsadosky.org.ar/>

⁵ See OECD (2019), PISA 2018 Results (Volume I): What Students Know and Can Do, PISA, OECD Publishing, Paris, and OECD (2019), Uruguay - Country Note - PISA 2018 Results, OECD Publishing, Paris. Retrieved from https://www.oecd.org/pisa/publications/PISA2018_CN_URY.pdf

⁶ Centro de Información para la Mejora de los Aprendizajes (CIMA), BID. (2015)

interest in the school curriculum is the main reason why Uruguayans between 15 and 17 years of age drop out school⁷.

- II.8 Korea Experience.** The Korean experience offers an interesting model that could be used in Uruguay, capitalizing on existing technology and the CEIBAL platform. Korean educational authorities actively used a variety of EdTech for distance learning classes of elementary and secondary schools, after sudden spreads of COVID-19 stopped the students from going to school. Korea has incorporated CT as an official subject in the national curriculum. Various programs are used to help students develop CT skills. One of the programs is called the Entry platform, provided in most schools for free. Students can learn the basics of algorithms, learn various programming languages, and conduct collaborative projects within classes. The adaptive learning program has been helpful for students to study at their own pace and the reports that teachers get from the platform inform teachers of who is falling behind. By gathering teachers together, a community has been formed and they were able to share their experience and share ideas on best ways to use the adaptive learning platforms in their classes. Classting platform is another good example of EdTech used on a national scale. More than 90% of schools are using the Classting platform in Korea, which connects students and teachers to improve their communication. It also provides a space for teachers to share learning contents and uses an AI adaptive learning program.
- II.9 High Touch – High Tech.** Addressing those challenges hinges on the ability to provide personalized learning at scale for every student. Teaching at the right learning abilities has been identified as a key factor to student centered learning and technology could help achieve this. Artificial Intelligence (AI) offers one of the most promising breakthroughs towards making quality education available for all and addressing 21st century skills⁸. AI can cater to the different abilities and backgrounds of every student, that earlier and more standardized technologies were not able to do. In this way, AI directly addresses the key binding constraint - the mismatch between classroom instruction (delivered in a standard way) and student learning levels. Adaptive learning technologies can provide targeted support at scale by adapting teaching materials to students' prior knowledge. These adaptive learning algorithms offer a cost-effective way of learning at the right pace and at the right level for students in resource-constrained contexts, with the potential to enable low-income countries to leapfrog current constraints to development. However, to personalize learning for every student, High-Tech learning should be combined with High-Touch learning: students need human connections and guidance that AI cannot offer. Teachers should be empowered to shift their roles toward High-Touch learning.⁹ Students no longer need teachers to the same extent for knowledge acquisition, but the human connection

⁷ See De Melo, G, & Failache, E. y. (2016). Adolescentes que no asisten a ciclo básico: caracterización de su trayectoria académica, condiciones de vida y decisión de abandono. Montevideo: Documento de trabajo INEE.

⁸ See some examples from India, Vietnam and Kenya: Muralidharan, Karthik, Abhijeet Singh, and Alejandro J. Ganimian (2019), Disrupting Education? Experimental Evidence on Technology-Aided Instruction in India, American Economic Review, 109 (4): 1426-60; Arizona State University (2019), ASU Vietnam Adaptive Math Prototype Final Report and Whizz Education (2020), Case study - iMlango. Retrieved from <https://www.whizzeducation.com/our-work/case-studies/imlango/>

⁹ See Education World Forum (2019), Combining High-Tech and High-Touch to Personalize Learning for Every Child - Research & Insight. Education World Forum, www.theewf.org/research/2019/combining-high-tech-and-high-touch-to-personalize-learning-for-every-child and Booyuel Kim, Yoon Soo Park, Euncheol Shin, and Hee-Seung Yang (2020), Evaluating teaching and learning effectiveness: the "High Touch- High Tech" learning project in Vietnam (Preliminary).

and guidance is needed to help students develop higher order skills necessary for the 21st century. Thus, HT-HT learning hinges on the radical shift in the role of teachers to offer human touches for students (High-Touch) while using AI to effectively deliver content knowledge for students (High-Tech). The Education Commission¹⁰ implemented a HT-HT pilot project in Vietnam. Through a partnership with Vietnam's Ministry of Education and Training and Arizona State University, the project sought to prototype a 7th grade math course featuring an adaptive learning platform that tailored instruction to individual learning levels (High-Tech), combined with software-informed, more personalized and active learning experiences provided by teachers (High-Touch). An independent impact evaluation found that one semester of HT-HT intervention increased students' math scores by more than 0.44 standard deviations, equivalent to two years of learning. HT-HT will enhance the education system's response to the COVID-19 emergency because it will provide new tools to support students in learning processes, especially those from low income families¹¹. Adaptive technology has shown that it can help close the achievement gap for struggling students, create more enthusiastic learners, enable gifted students to race ahead and, free up teacher time for teaching smaller groups. Uruguay will be the first country in LAC piloting HT-HT.

- II.10 **Strategic alignment.** Considering the above, this TC is consistent with the Institutional Strategy Update (UIS) 2010-2020 (AB-3008) and is aligned with the development challenge of social inclusion and equality, by promoting reduction in the inequities in the use of technology. It is consistent with Uruguayan Country Strategy (2016-2020) (GN-2836) contributing to its strategic objective of improving the quality of education. It is also consistent with the Strategy on Social Policy for Equity and Productivity (GN-2588-4) and with the Bank's Sector Framework Document for Education and Early Childhood Development (GN-2708-5), particularly with dimensions 1, high student learning goals guide provision of education services and 4, all schools have adequate resources and are able to use them for learning. This project is aligned with the objectives of the KPR (Korea Poverty Reduction Fund) since it will provide new tools to support students in learning processes, especially those with lower incomes.

III. Description of activities/components and budget

- III.1 **Component I. Design and implementation of HT-HT learning strategies in math teaching (US\$340,000).** This component seeks to improve mathematics learning and pedagogical practices. Taking advantage of PAM that offers students more than 100,000 math activities, this component will pilot HT-HT providing different learning paths for each student and aiming at giving students individualized attention. This component will finance: (i) the design of a strategy in math; (ii) the design of teacher training materials and the teacher training; (iii) constant support to educational centers through visits; (iv) the acquisition of educational-math-platforms' licenses; and (v) the development of personalized reports for students and teachers.
- III.2 **Component II. Design and implementation of HT-HT learning strategies for CT (US\$390,000).** This component seeks to foster problem-solving skills that involve the

¹⁰ The Education Commission is a global initiative encouraging greater progress on Sustainable Development Goal 4 – ensuring inclusive and quality education and promoting lifelong learning for all. <https://educationcommission.org/>

¹¹ Booyuel Kim, Yoon Soo Park, Euncheol Shin, and Hee-Seung Yang; Evaluating Teaching and Learning Effectiveness: The “High Touch – High Tech” Learning Project in Vietnam (Preliminary), 2020.

action of computational agents, as a basic skill that all students should develop for the digital society. This component will finance: (i) the design of a strategy in CT; (ii) the design of teacher training materials and the teacher training; (iii) constant support to educational centers through visits; (iv) the acquisition of a new educational platform for CT; and (v) the development of personalized reports for students and teachers.

- III.3 **Component III. Monitoring and evaluation of results (US\$150,000).** To have a full understanding of the results and assess the pilot implementation process, this component will finance costs associated with the following activities: (i) impact/results assessments of the HT-HT EdTech learning strategies in math and CT, especially on how HT-HT learning enables students to create and develop skills. The evaluation will look at how AI and mobile technology facilitate students remembering and understanding content (High-Tech), that followed by learning how to apply, analyze, evaluate what they understand, and finally results in learning to create, through engaging with teachers (High-Touch); (ii) an assessment of the process; and (iii) dissemination of results both in Uruguay and other countries in the region.
- III.4 The program will also cover the costs of financial audits, and administrative expenses.
- III.5 The total cost of this TC will be US\$880,000 and will be financed through a contribution of US\$800,000 from resources of the KPR (Korea Poverty Reduction Fund)¹² and a contribution of US\$80,000 from the local counterpart (in cash and in kind).

Indicative Budget

Activity/Component	IDB/Fund Funding	Counterpart Funding	Total Funding
Component I: Design and implementation of HT-HT learning strategies in math teaching.	US\$310,000	US\$30,000	US\$340,000
Component II: Design and implementation of HT-HT learning strategies for CT.	US\$360,000	US\$30,000	US\$390,000
Component III: Monitoring and evaluation of results.	US\$130,000	US\$20,000	US\$150,000

IV. Executing agency and execution structure

- IV.1 The executing agency will be CEIBAL with the support of the Executing Unit of Loan UR-L1141. The reasons for requesting the support of the Executing Agency are: (i) it has wide experience and expertise in executing IDB loans and TCs; and (ii) it is the Government agency for innovation in education and for the implementation of digital transformation projects and policies in Uruguay, related to the education sector. CEIBAL will contract the goods, services, and consultancies necessary for the project in accordance with Bank policies (documents GN-2349-15 and GN-2350-15).
- IV.2 CEIBAL will work in collaboration with the Education Commission (EC), implementing the project together. Their implementation and research teams, together with technology providers, will examine the best suitable HT-HT model for both pilots so that it could be scaled in the future. EC is partnering with selected countries, academic institutions, and tech thought leaders to test the applicability and adaptability of HT-HT learning in diverse contexts. The first pilot - currently in Vietnam - will be followed by the second pilot in Uruguay. The activities to be carried out under this operation have

¹² KPR has communicated the eligibility of this project on May 19th, 2020.

been included in the Procurement Plan (Annex IV) and will be executed in accordance with Bank policies applicable to the Procurement of Goods and Works and to the Selection and Contracting of Consultants (GN-2349-15 and GN-2350-15, respectively).

- IV.3 The consultancy for the design and implementation of an innovative pedagogical approach for mathematics and CT, using the HT-HT learning approach, will be contracted directly to the EC, Hub Asia. The EC is a global initiative encouraging greater progress on Sustainable Development Goal 4 – ensuring inclusive and quality education and promoting lifelong learning for all. The EC, pooling a group of experts from various fields of knowledge, has developed similar strategies in other countries with very good results. A successful experience has already been developed in Vietnam. The EC has an experience of exceptional worth that justifies direct contracting in accordance with the Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (GN-2350-15, paragraph 3.10 and 3.11.d).
- IV.4 Given the high demand for educational platforms, it is necessary to update the Business Intelligence (BI) tool. This service will be contracted directly to Quanam (Atel S.A). Quanam was in charge of implementing the BI tool and therefore they know the particularities of the installation, parameterization and use of it in CEIBAL, in addition to having vast experience in this type of work and being a Support Provider of IBM. Quanam's direct contracting is justified in the need to ensure compatibility with the current service. Moreover, Quanam has an experience of exceptional worth for the assignment, that justifies its direct contracting in accordance with the Policies for the Procurement of Goods and Works financed by the Inter-American Development Bank (GN-2349-15, paragraph 3.10 and 3.11.b).
- IV.5 In order to monitor and evaluate the results, the executing agency must present to the Bank semiannual progress reports within 30 days of completion of each calendar semester, which must include, among others, progress achieved based on the results matrix, the Procurement Plan and the Financial Plan, with a schedule of use of funds. Likewise, the executing agency must submit a report of the Project's audited financial statements with a deadline of 120 days after the last disbursement date, as well as a final report.
- IV.6 The execution and disbursement period of the TC is estimated at 24 months.
- IV.7 With the acceptance of the Bank, resources from the contribution may be used to reimburse expenses incurred or finance those incurred in the project from April 18th, 2020, TC approval date and until the effective date, in compliance with requirements analogous to those established for eligible expenses.

V. Major issues

- V.1 The risks associated with this operation are low and manageable. The main risks identified for the implementation are: (i) to adequately address privacy concerns in data management and data retrieval; and (ii) to ensure the engagement of all relevant institutional stakeholders in the project and the coordination with the education authorities. CEIBAL has strong protocols to assure privacy, and their broad experience in implementing this type of project will be a key factor in mitigating these low risks.

VI. Exceptions to Bank policy

- VI.1 There are no exceptions to Bank Policies.

VII. Environmental and Social Strategy

VII.1 Given the characteristics of the project, no negative environmental or social risks are expected. Therefore, the classification of this operation according to environmental safeguards policy (OP-703) is “C”.

Required Annexes:

[Request from the Client_46271.pdf](#)

[Results Matrix_22465.pdf](#)

[Terms of Reference_4553.pdf](#)

[Procurement Plan_65697.pdf](#)