

TC Document

I. Basic Information for TC

▪ Country/Region:	COSTA RICA
▪ TC Name:	Pertinence of Natural Science and Environmental Secondary Education in Rural Agricultural Communities
▪ TC Number:	CR-T1228
▪ Team Leader/Members:	Naslund-Hadley, Emma Ingrid (SCL/EDU) Team Leader; Biehl, Maria Loreto (SCL/EDU) Alternate Team Leader; Alfonso, Mariana (CSD/CSD); Baruzzi, Miguel (VPC/FMP); Bazan, Jorge Antonio (SCL/EDU); Blasco, Ivana (SCL/EDU); Holguin Madrinan, Alejandra (SCL/SCL); Lozano, Raul Enrique (VPC/FMP); Murguia Baysse, Juan Manuel (CSD/RND); Prada Patino, Maria Fernanda (SCL/EDU); Salazar, Lina Piedad (CSD/RND); Sanmartin Baez, Alvaro Luis (LEG/SGO)
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	n/a
▪ Date of TC Abstract authorization:	23 Apr 2020.
▪ Beneficiary:	Ministry of Public Education (MEP); communities of Limon and Punarenas
▪ Executing Agency and contact name:	Instituto Interamericano De Cooperacion Para La Agricultura, Inter-American Development Bankón Para La Agricultura, (US\$659,500), Inter-American Development Bank (US\$540,500)
▪ Donors providing funding:	Japan Special Fund Poverty Reduction Program(JPO)
▪ IDB Funding Requested:	Japan Special Fund Poverty Reduction Program (JPO): US\$1,200,000.00 Total: US\$1,200,000.00
▪ Local counterpart funding, if any:	US\$70,000.00 (In-Kind)\$S\$
▪ Disbursement period (which includes Execution period):	36 months
▪ Required start date:	7/15/2020
▪ Types of consultants:	Individuals and firms
▪ Prepared by Unit:	SCL/EDU-Education
▪ Unit of Disbursement Responsibility:	CID/CCR-Country Office Costa Rica
▪ TC included in Country Strategy (y/n):	Yes
▪ TC included in CPD (y/n):	No
▪ Alignment to the Update to the Institutional Strategy 2010-2020:	Social inclusion and equality; Environmental sustainability; Gender equality

II. Objectives and Justification of the TC

- 2.1. In Latin America and the Caribbean (LAC) a third of the population lives in rural areas (123 million people), ranging from less than 10% in Argentina and Uruguay to more than 40% in Barbados, Guyana, Haiti, Guatemala and Honduras (FAO, 2018). The rural areas are central to most LAC economies, accounting for some 5% of the region's GDP (although in many countries it is above 10%). Agriculture is important to livelihoods. In 2018, 14.1% of the total labor force was employed in the sector (OECD-FAO, 2019). Yet, rural youth lack opportunities to develop the skills they need for work and life. Secondary education attendance is 10 percentage points

lower in rural than in urban areas (68.6% compared with 78.5%) (CIMA, 2020). The rural-urban gap is even more visible in students' learning. PISA 2015 data show that, on average, Latin American students in rural schools score 56.6 points lower in reading than students in urban schools, which is almost equivalent to two years of schooling. The gap is only marginally smaller in science and mathematics (CIMA, 2020). The problem is particularly pronounced in Central America and Mexico where the gap in access to secondary schooling is as high as 30 and 19 percentage points in Honduras and Mexico, respectively (CIMA, 2020). The rural-urban learning gap in Costa Rica is 47,9 points on the 2018 PISA reading exam, equivalent to over a year of studies (CIMA, 2020). The rural-urban gap is even more visible in students' transitions to higher levels of education and in the educational expectations that precede their decisions to remain in the education system. In all Central American countries even rural students, who outperform their urban peers on PISA, are less likely to expect completing a university degree than their urban counterparts. In addition to the urban-rural learning gap, LAC has the world's most pronounced gender learning gap in mathematics and science subjects (Bos et al., 2015).

- 2.2. The low completion and learning levels of secondary education have a spectrum of causes, including: a lack of quality teachers (Cruz-Aguayo et al., 2020); distance and travel time negatively affect enrollment and attendance, particularly of disadvantaged students; the prevalence of multi-grade classrooms; inadequate school infrastructure (Bos et al., 2016); and lack of guidance in the transition to secondary education (Hernández and Raczyński, 2014). These school-related factors are confounded with the economic needs of rural youth, who often migrate to urban areas with the hope of improving their economic opportunities or drop out of school to work in agricultural activities.
- 2.3. One often overlooked determinant of the low levels of learning and completion rates, is the use of curricula, textbooks and pedagogical materials that have an urban bias, seldom focusing on the skills needed to excel in rural life (Gasparini, 2003). Specifically, little emphasis has been placed on teaching students about topics that are relevant for their participation in agricultural activities, the main source of livelihood in rural areas. For those who decide to work in agriculture their schooling experience seldom provides them with the content, knowledge and skills that could help them improve farm productivity. The skills gap translates into low levels of income and oftentimes food insecurity. Although there are many women farmers in LAC, the skill gap is particularly pronounced among women as fewer pursue agricultural education, limiting their chances of achieving positions with greater responsibilities in the agricultural sector (FAO, 2017).
- 2.4. This skill-gap is expected to be further amplified as there is evidence that the COVID-19 pandemic could also negatively affect the accumulation of human capital, particularly the employability and future income of young people who are in the transition from school to the labor market.
- 2.5. This poverty trap that arises from the low relevance of the educational curriculum, which is expected to be further amplified due to the COVID-19 pandemic, is of consequence in Central America. This region is facing strong challenges such as climate change, which dramatically affects the agricultural suitability of traditional crops. Additional technical training and knowledge would equip youth with the skills to guide them towards the adoption of new technologies and inputs to boost agricultural profitability, and ultimately decrease the rural-urban migration flows.

- 2.6. Costa Rica is no exception to the challenge of low relevance of the education curriculum. The secondary curriculum in rural areas, such as Limon and Punta Arenas, does not sufficiently address the rural reality. This is why to transform secondary education, in collaboration with the Ministry of Agriculture (MAG), the Directorate of Technical Education and Entrepreneurial Capacities (DETCE) has developed a new education curriculum program for learning agricultural, biological, and environmental sciences. The program identifies the areas of study as well as the learning competencies that students should master. The new curriculum program covers different value-added approaches in agriculture and planning a value-added enterprise. Moreover, DETCE has identified as an additional determinant for the low levels of learning, that the teaching style often is not conducive to learning, as it tends to be lecture style. Against this background, the new education program includes hands on Inquiry- and problem-based pedagogy (IPP). IPP allows students to learn through rich practical work experiences, group work, and problem-solving opportunities in settings that derive meaning to the child. The IDB has evaluated IPP through 10 rigorous randomized trials and found that increased math test scores by 0.18 standard deviations and science test scores by 0.16 standard deviations after 7 months. The results are robust across a wide set of geographic, socio- economic, and cultural, age/grade, and teacher background contexts ([Bando, Näslund-Hadley & Gertler](#)).
- 2.7. **General objective.** In response to the poverty trap that arises from the low relevance of the educational curriculum, which is expected to be further amplified due to the COVID-19 pandemic, the objective of the proposed project is to develop and test a model for pertinent natural science and environmental secondary education in rural agricultural areas, contrasting different approaches to teacher training. The model will build on the learning objectives and content areas specified in the new curricular program for agricultural education.
- 2.8. **Specific objectives.** The specific objectives are to: (i) based on the new curricular program, develop a contextualized model for teaching and learning agricultural, biological and environmental sciences at secondary schools in areas where agriculture is an important source of livelihood; and (ii) rigorously pilot the model in Costa Rica, including one version that trains teachers in the new content and one version that also provides pedagogical support.
- 2.9. **Targeting.** DETCE and MAG have prioritized Costa Rica's provinces of Limon and Puntarenas, which have Costa Rica's highest levels of poverty (ENAH0 2017), and the highest level of employment in the agricultural sector (24.3 and 38.1%, respectively). Limon has the country's highest youth unemployment rate (8.7%) (Population Census, 2011). For the experimental impact evaluation, some additional geographical areas may be included as needed to ensure statistical power for the analysis of effect sizes.
- 2.10. **Strategic Alignment.** This TC is consistent with the Update to the Institutional Strategy (UIS) 2020-2023 (AB-3190-2) and is aligned with the development challenge of social inclusion and equality as it targets schools located in areas of low socio-economic development. The TC is also aligned with the cross-cutting theme of (i) gender equality as it addresses digital and STEM gaps; and (ii) environmental sustainability as the education model centers around the issue of environmental sustainability . The TC is also aligned with the Bank's prioritization of learning and school attainment at the secondary levels as laid out in the Strategy on Social Policy for Equity and Productivity (GN-2588-4), and with the priorities of the

[Country Strategy with Costa Rica 2019-2022](#) (GN-2977-1) to reduce dropout rate in secondary school, and improve the quality and relevance of training for 21st-century jobs. The TC is also aligned with the Agriculture the Sector Framework Document (GN-2709-0) in its prioritization of measures to address the challenges of inequality, poverty, and low productivity. This TC additionally fosters STEAM skills, which is a priority within the Bank's Sector Framework Document for Education and Early Childhood Development (GN-2708-5). The proposed project is also aligned with the Japan Special Fund (JPO) eligibility criteria to "support well-targeted poverty reduction and social development activities that respond directly to the needs of socially and/or economically disadvantaged people." The project is also consistent with the focused sectors of the JPO, which include education.

III. Description of activities/components and budget

- 3.1. To achieve its objectives, the technical cooperation will finance three components:
- 3.2. **Component I – Development and Pilot a Contextualized Model for Biological, Agricultural and Environmental Sciences Targeted for Secondary Education in Agricultural Areas (US\$599,500).** The aim of the component is to develop and pilot through an experimental evaluation a pertinent education model for teaching and learning natural and environmental sciences for secondary education contextualized for rural agricultural areas. The development of the education model will be participatory to ensure the contextualization of the content and skills it seeks to promote, involving MAG, DETCE, parents, educators, students, and local agricultural producers in the design. Building on the emergence of new technologies, the model will encompass the development of learning materials, as well as teacher training modules. The model will seek to promote student interest in pursuing careers in agriculture, including the promotion of women in agriculture. Taking advantage of the high penetration of internet in Costa Rica's rural schools, the materials will be made available also on a digital platform.¹ To facilitate for schools with slow internet connections, digital contents will be made available also through external drives. Approximately 100 teachers will receive training and on-going technical assistance to help them understand the concepts and implement the new model in their classrooms. One group of teachers will receive additional instruction in how to make the education hands-on with practical experiences through an IPP methodology with hands-on group work activities.² The experimental pilot will be implemented in the provinces of Limon and Punta Arenas.
- 3.3. **Component II – Assessment of Children's Skills Development (US\$280,500).** The aim is to assess the effectiveness of the model for biological, agricultural and environmental sciences targeted for secondary education in agricultural areas through an experimental evaluation, to be implemented in the last quarter of 2021, which contrasts any changes in learning of students in two treatment groups (Group I and II) with a group of comparison students (Group III). Approximately, 1,500 students will be randomly assigned to different teachers during two academic years in about 102 schools with access to computers and internet. To avoid any

¹ Microsoft will contribute to the pedagogical model definition, digital contents development and delivery systems. Microsoft will collaborate with a specific learning paths and a collaboration platform to support the project implementation including best practices documentation and analysis.

² The institutional counterparts have indicated that an inter-institutional agreement is not necessary to continue developing the corresponding educational materials.

selection bias, teachers will similarly be randomized into the three groups. The outcome indicators will include: (i) the effectiveness of the education model and pedagogical approach in improve student's content and problem-solving skills; (ii) heterogeneity analysis of effect size differences among various beneficiary groups (i.e. gender, native language, and socioeconomic status) with results used to facilitate adjustments to the model; (iii) detection of indirect effects on other subject areas; and (iv) teacher and student perceptions about learning, youth life plans and mindsets. The indicator on life plans will allow to measure any impact on the interest of students to pursue careers in agriculture. Additional information on the evaluation design, including tentative power calculations are available in the following [link](#).

- 3.4. **Component III – Research and Dissemination (US\$200,000).** TC resources will be used to finance research support to contrast pilot data with data on rural secondary and technical education in Central America, as well as the dissemination of the findings. Research questions will include: What are the optimal conditions for blended technical education in agricultural areas, and for different student profiles? What are strategies for promoting women's pursuit of careers in agriculture? What are the careers of the future in agriculture in LAC? What are the proven strategies to incentivize young people to remain in agricultural sector? Specifically, the dissemination activities will include the development of two videos, publications and a workshop in Costa Rica, which will take place once the evaluation of the pilot has been completed in 2023 under the current guidelines issued by the Ministry of Health at the time. The generous support of the Government of Japan will be promoted in all videos, newsletters and reports.
- 3.5. The total cost of the TC is US\$1,470,000, of which US\$1,200,000 will be financed by the Japan Poverty Fund (JPO). The remaining US\$270,000 will be provided by the Inter-American Institute for Cooperation on Agriculture (IICA) as in kind local counterpart (US\$70,000), and as in kind joint co-financing grant by Microsoft (US\$200,000). IICA charges an administration fee of 10% of the amount of the component it implements, equivalent to US\$60,000. In agreement with JPO guidelines, 5% of project resources will be used to cover expenses related to enhancing project preparation and execution by SCL and CSD, including IDB personnel travel costs to provide technical assistance.

Indicative Budget (US\$)

Activity/Component	Description	IDB/JPO [IDB executed]	IDB/JPO [IICA executed]	Counterpart Financing [IICA executed]	Total Funding
Component 1. Curriculum development and Pilot Implementation	Firm	-	599,500	270,000	869,500
Component 2. Assessment of Children's skills development	Firm + consultants	280,500	-	n/a	280,500
Component 3. Research and Dissemination	Firm + consultants	200,000	-	n/a	200,000
Project Administration	Consultants Travel, IDB monitoring	60,000	60,000	n/a	120,000
Total		540,500	659,500	270,000	1,470,000

IV. Executing agency and execution structure

- 4.1. The TC will have two executing agencies: the Inter-American Institute for Cooperation on Agriculture (IICA) and the Inter-American Development Bank (IDB).
- 4.2. **IICA.** Component I will be executed by IICA. The Ministry of Public Education (MEP) has requested that the IICA in Costa Rica execute this component based on its long trajectory in Costa Rica supporting the execution of projects. Since its founding, in 1942, IICA provides technical cooperation to promote the competitive and sustainable development of agriculture in the Americas and the improvement of the quality of life in rural areas. The Institute's efforts are currently geared to helping its Member States achieve sustainable, competitive and inclusive agriculture by means of actions focused on four strategic objectives: (i) improving the productivity and competitiveness of the agricultural sector; (ii) strengthening agriculture's contribution to the development of territories and rural well-being; (iii) mitigate and adapt to climate change and make better use of natural resources; and, (iv) improving food security. IICA works very closely with the ministries of agriculture of its 34 Member States, providing support on issues of common concern through actions carried out at the hemispheric, regional and national levels. The IICA will have the technical coordination of project activities in close coordination with MAG and DETCE. The technical teams of IICA will collaborate with the MEP regional education supervisors in the planning and supervision of the field work. With an annual budget of some US\$32 million, IICA has fiduciary experience. However, as outlined in the audit section below, no resources from the TC will be directly managed by IICA.
- 4.3. **IDB.** Components II and III will be executed by the IDB through the Education Division (SCL/EDU). The MEP has requested that the IDB execute these components based on its long trajectory of experimental randomized control trials in the education sector in Latin America, more broadly in Central America and Costa Rica. In line with Appendix 10 of the Operational Guidelines for Technical Cooperation Products (GN-2629-1), Bank execution of the TC is justified as contracting by the IDB enhances the independence of an experimental evaluation. Moreover, through its ongoing policy dialogue with the beneficiary country, civil society organizations in Central America, and the STEM research community, the Bank is well placed to coordinate all activities to be financed by this TC and to serve as the executing agency of Components II and III. As the executing agency of the TC, the Bank will be responsible for: (i) identifying the studies and technical work required for the execution of the TC; (ii) selecting and hiring consultants to provide the necessary services; (iii) supervise the consulting services that the beneficiary provides technical inputs to; and (iv) manage the execution and delivery of consulting services.
- 4.4. Also, Microsoft will be a partner in the execution of this TC, providing in-kind joint co-financing. Microsoft has an education specialist in Costa Rica, who will work on the execution of component I above. Microsoft and the IDB are [partners in the promotion of digital transformation in LAC](#), including development of digital [platforms](#) to encourage transparency in government spending, and more recently digital solutions through the [Digi/Gob platform](#), helping to ensure the continuity of administrative procedures during the COVID-19 pandemic. The existing MoU between the IDB and Microsoft ([SC-69](#)) establishes that Microsoft and the IDB will coordinate "*in making available resources for the development of the Bank's developing member countries,*" including "*development of improved student learning ... to reduce the digital divide between and within countries.*"

- 4.5. Condition prior to the first disbursement.** The signature of an agreement between the IICA and MEP outlining the details of the execution scheme and the counterpart contribution.
- 4.6. Execution period.** The TC will have an execution and disbursement period of 36 months.
- 4.7. Procurement.** For component I, IICA will follow standard Bank procurement procedures based on the Policies for the Selection and Contracting of Consultants Financed by the IDB (GN-2350-9). All activities to be undertaken by IICA have been included in the Procurement Plan for Recipient Executed TCs. The Bank will undertake ex-ante revisions. All activities to be executed under Components II and III have been included in the BEO Procurement Plan (see Annex IV) and will be contracted in accordance with Bank policies as follows: (i) AM-650 for Individual consultants; (ii) GN-2765-4 and Guidelines OP-1155-4 for Consulting Firms for services of an intellectual nature and; and (iii) GN-2303-28 for logistics and other related services.
- 4.8. Reporting.** IICA will be responsible for the fiduciary management of the project resources, undertake procurement processes, monitor consultancies, and provide semiannual reports to the IDB, including the information related to the local counterpart. The technical teams of IICA will collaborate with the MEP education supervisors in the planning and supervision of the field work.
- 4.9.** The Project Team will be responsible for the review of all technical and financial reporting. The Team Leader and Alternative Team Leader, as well as the CSD Team Members, will be responsible for annual monitoring of activities in the field. Short biweekly progress meetings will be conducted with the IICA, the Ministry of Education, and the evaluation consultancy firm. A consultancy firm will be contracted to conduct a rigorous evaluation of the pilot, including quantitative and qualitative data collection, as well as monitoring of the intensity of the treatment in schools.
- 4.10. Audit.** The fiduciary risk is low and therefore no audits are contemplated. The reasons for the low fiduciary risks are: (i) the activities under Component I will be carried out under one consultancy; and (ii) that the number of financial transactions is minimal; (iii) no resources will be transferred to IICA as payments will be processed by the Bank using the direct payment method.

V. Major issues

- 5.1.** Randomized Controlled Trials (RCTs) are considered the most rigorous evaluation methodology and, all else equal, produce the most accurate (i.e. unbiased) results. There are some potential threats to the validity of the experiment that will be carefully monitored to guarantee that the results are reliable. The first threat is attrition; if this is correlated with the treatment assignment it can violate the internal validity of the experiment. To prevent attrition, we will collect detail information on students (e.g. student identification number, email, social media and cellphone) and caregivers (cellphone numbers, potential migration areas, social media information) that will allow us to track them over time. Another threat is that the intervention is not correctly implemented, with students in the control group receiving the treatment, or treatment being partially delivered. To mitigate this, treatment delivery will be strictly monitored, hence contamination and measure implementation intensity is avoided, allowing incorporating this dimension to the analysis. The school closures due to the 2020

COVID-19 pandemic are not expected to impact pilot implementation, as the model will not be ready for roll out until the third trimester of 2021.

- 5.2. To ensure adherence to the ethical values and principles for human subject research, the RCT design will be submitted to an Institutional review Board (IRB)³ and registered in the [AEA RCT Registry](#).⁴ The Legal Department (LEG) was consulted during project preparation regarding the management human subject data. Since the IDB is the executing agency for the RCT and will manage the database, there is no need for an agreement with IICA or the MEP about the management of sensitive data.

VI. Exceptions to Bank policy

- 6.1. No exceptions to Bank policy are foreseen.

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](#)).

Required Annexes:

[Request from the Client_29769.pdf](#)

[Results Matrix_48565.pdf](#)

[Terms of Reference_12834.pdf](#)

[Procurement Plan_47661.pdf](#)

³ An institutional review board (IRB), is a committee that reviews the methods proposed for research to ensure that they are ethical. Such boards are formally designated to approve (or reject), monitor, and review biomedical and behavioral research involving humans. Since the IDB does not have its own IRB, IDB team leaders, who act as Principal Investigators (PI), attain and maintain current approvals to its research through IRBs at universities or other research institutions. To get IRB approval the PI must attain and maintain current a Human Subject Research Certification.

⁴ The American Economic Association (AEA) publishes one of the World's most prestigious academic journals in economics: the American Economic Review. The AEA operates a registry for RCTs that adhere to quality standards for rigorous research as well as ethical standards.