TC ABSTRACT

I. Basic Project Data

▪ Country/Region:	CHILE/CSC - Southern Cone
▪ TC Name:	From Pilot to Scale: Evaluating the Expansion of Chile's AI-Powered Teacher Induction Program
▪ TC Number:	CH-T1339
▪ Team Leader/Members:	ELACQUA, GREGORY MICHAEL (SCL/EDU) Team Leader; JAIMOVICH, ANALIA VERONICA (SCL/EDU) Alternate Team Leader; DEL TORO MIJARES ANA TERESA (SCL/EDU); KUTSCHER CAMPERO MACARENA ISABEL (SCL/EDU); LOPEZ GELB LOREN VIVIANA (SCL/EDU); BAZAN, JORGE ANTONIO (SCL/EDU); SANMARTIN BAEZ, ALVARO LUIS (LEG/SGO)
▪ Taxonomy:	Research and Dissemination
▪ Number and name of operation supported by the TC:	N/A
▪ Date of TC Abstract:	30 Aug 2024
▪ Beneficiary:	Chile
▪ Executing Agency:	INTER-AMERICAN DEVELOPMENT BANK
▪ IDB funding requested:	US$262,500.00
▪ Local counterpart funding:	US$0.00
▪ Disbursement period:	24 months
▪ Types of consultants:	Individuals; Firms
▪ Prepared by Unit:	SCL/EDU - Education
▪ Unit of Disbursement Responsibility:	SCL/EDU - Education
▪ TC included in Country Strategy (y/n): ▪ TC included in CPD (y/n):	Yes No
▪ Alignment to the Update to the Institutional Strategy 2010-2020:	

II. Objective and Justification

2.1 Objective 1: Deploy the AI-powered chatbot to 20,000 novice teachers in Chile (approximately 10% of the total workforce) and conduct a Randomized Control Trial (RCT) to assess its effectiveness. This will involve expanding the use of the chatbot beyond the initial pilot and rigorously evaluating its impact on teacher well-being, motivation, retention, and student outcomes. Objective 2: Support the national scale-up of the AI-powered chatbot for mentoring teachers, under government leadership. This objective aims to assist the Chilean Ministry of Education in implementing the chatbot system on a larger scale, potentially reaching all novice teachers in the country to meet the legal mandate of providing mentoring for all new educators. Objective 3: Disseminate findings regionally to share lessons learned. This objective focuses on sharing the results and insights gained from the chatbot implementation and evaluation with other countries in the region. The goal is to inform similar initiatives and potentially transform how the IDB assists countries on topics related to teachers and teacher careers.

2.2 Chile faces a severe shortage of qualified teachers due to an 8% annual decrease in teacher education program entrants over the last five years coupled with high teacher attrition. From 2004 to 2023, 22% of teachers left the profession in their first year, 14% in the second year, and turnover stabilized at 3% from the third year onwards. Notably, novice teacher turnover is three times higher than that of experienced colleagues. By

2025, Chile is projected to have a deficit of over 30,000 teachers, particularly in math and science and for disadvantaged regions and schools (Medeiros et al., 2018; Elige Educar, 2020; Bertoni et al., 2020; Elacqua et al., 2022).

2.3 Education systems employ multiple strategies to improve teaching quality and retain novice teachers. Recent studies show that induction and mentoring programs for novice teachers significantly improve outcomes, including retention, instructional effectiveness, and student achievement (Keese et al., 2023). However, these programs can be very costly and challenging to scale because they require highly specialized and time-intensive human resources (Kraft et al., 2018; World Bank, 2023).

2.4 To better support novice teachers and reduce their attrition from the education system, the Chilean Ministry of Education (MINEDUC) implemented the National Induction and Mentoring System in 2017. A recent evaluation found that while the program effectively supports novice teachers, it has reached less than 1% of the target population. This limited reach is due in part to constrained human and institutional resources, as well as high program costs (UNDP, 2023).

2.5 In response, MINEDUC has partnered with the IDB to design and pilot an innovative, technology-driven intervention (RG-E1957) to increase the impact and reach of the National Induction and Mentoring System. The strategy centers on creating a virtual mentoring system delivered via WhatsApp, utilizing generative AI for personalized support, and building on the content of the existing model. Novice teachers and their school principals interact with AI-powered chatbots tailored to their roles. Novice teachers receive pedagogical advice, socioemotional support, and career guidance throughout the school year, while principals receive strategies and guidance on how to best support novice teachers at their school. The system aims to boost teacher motivation and well-being, ultimately improving teacher retention rates and student outcomes.

2.6 The objective of this TC is to support the expansion of the chatbot in 2025 to meet the legal mandate of providing mentoring for all novice teachers and to conduct a rigorous evaluation to assess its effectiveness. This proposal draws on insights from a successful 2021 IDB pilot using a rule-based WhatsApp chatbot to encourage enrollment in teacher education programs (Ajzenman et al., 2023). Given the rapid development of AI technologies, there is limited evidence on their effectiveness and best practices for conceptualizing, developing, testing, piloting, and scaling these technologies in educational interventions. Our study aims to fill this gap by providing a rigorous evaluation of AI-powered chatbots offering personalized support for novice teachers.

III. Description of Activities and Outputs

3.1 **Component I: Component 1: Large-scale implementation of the AI-powered chatbot based on the pilot results and RCT to assess its effectiveness. .** In the first component of the project, the IDB team will work closely with Chile's MINEDUC and the contracted technology consulting firm (CF) to deploy the chatbot. A total of 20,000 novice teachers (accounting for 10% of the total teacher workforce and 100% of novice teachers) will participate in the implementation across pre-primary, primary, and secondary levels of education. The team will experimentally evaluate the impact of the intervention through a Randomized Control Trial (RCT).

3.2 **Component II: Component 2: Support national scale-up of AI chatbot implementation. .** The IDB team will collaborate with MINEDUC to facilitate the national deployment of the chatbot. Leveraging insights from the RCT and the implementation process, the team will provide support to ensure the integration of the chatbot into the existing infrastructure for novice teacher support. This support

includes assisting in the development of implementation strategies, providing training sessions for educators and system-level administrators, and offering ongoing technical assistance.

3.3 **Component III: Component 3. Regional dissemination. .** For the final component of the project, the team will collaborate with the Chilean MINEDUC to extract lessons learned and policy implications from the intervention. The team will then disseminate these findings and lessons both internally within the IDB, and externally to other relevant stakeholders. Internally, the team will prioritize applying the lessons learned and findings to inform similar projects already in development across the region.

IV. Budget

Indicative Budget

Activity/Component	IDB/Fund Funding	Counterpart Funding	Total Funding
Component 1: Large-scale implementation of the AI-powered chatbot based on the pilot results and RCT to assess its effectiveness.	US$181,250.00	US$0.00	US$181,250.00
Component 2: Support national scale-up of AI chatbot implementation.	US$56,250.00	US$0.00	US$56,250.00
Component 3. Regional dissemination.	US$25,000.00	US$0.00	US$25,000.00
Total	**US$262,500.00**	**US$0.00**	**US$262,500.00**

V. Executing Agency and Execution Structure

5.1 This TC will be executed by the Bank through SCL/EDU. The main reason for this execution structure is that the Bank has developed strong expertise in the use of technology, including AI, to improve educational outcomes cost-effectively. This TC builds on RG-E1957, which was also executed by the Bank through SCL/EDU and financed the initial conceptualization, development, and piloting of the AI-powered chatbot during the 2024 school year. As a continuation and extension of this work, SCL/EDU is best positioned to carry out this TC.

5.2 The project team has ample experience in carrying out similar research projects focused on supporting teachers and implementing more effective teacher policies in Latin America, successfully, leveraging technology to increase scalability and impact. Most recently, the team led a collaboration with the Chilean government to leverage WhatsApp technology to improve teacher recruitment systems (Ajzenman et al., 2023). Through the design and implementation of this past project, the team gained important experience in dealing with issues related to user experience, data privacy, and data collection, as they relate to the use of chatbots in the education sector, which is highly relevant for the project proposed here. The team has also recently collaborated with the governments of Ecuador and Peru on initiatives to improve teacher allocation (RG-T3433, EC-T1385, PE-T1447, RG-E1672). These initiatives used technology and behavioral science insights to encourage teacher applicants to apply to hard-to-staff schools and to reduce applicant congestion and improve the efficiency of the teacher recruitment process (Ajzenman et al., 2021 and Elacqua et al., 2022). Currently, the team is involved in similar ongoing projects with Brazil, Colombia, Costa Rica, and Guyana, among others.

VI. Project Risks and Issues

6.1 A first key potential issue concerns the quality of the technology to be deployed within the treatment arms, specifically, the risk that the AI-powered chatbot providing mentoring support may share incorrect, inconsistent, or hallucinatory information with users. To mitigate this risk, the team has hired with a highly specialized technology firm to develop the chatbot, with experience in developing similar products and platforms for the social sector, that will implement rigorous and comprehensive testing, quality assurance, piloting, and monitoring protocols. Second, the chatbot is being developed with strict content parameters, that is, it is being designed to limit interactions with users on specific topics regarding pedagogical guidance, socioemotional support, and career advice. Third, the chatbot is being developed and tested over an extended timeline to ensure it is functioning well.

6.2 A second potential issue is that users may not actively engage with the AI-powered chatbot, which could limit its impact on the expected outcomes. To mitigate this risk, the chatbot is being developed to provide users with personalized, relevant, and timely support, which will increase the perceived value of the chatbot's support and encourage regular engagement. Importantly, novice teachers and experienced teacher mentors are both participating in the development of the chatbot via user research focus groups and interviews, tailored to gather insights about the specific functionalities the chatbot must include to be of use and value to teachers. During the chatbot's scale-up during the 2025 calendar year, the team will closely monitor engagement metrics, such as the frequency and duration of interactions, and gather user feedback to continuously improve the chatbot's usability and effectiveness.

6.3 The final potential issue concerns data privacy. The collection, storage, and use of teacher data through the chatbot may raise concerns about data privacy and security. Teachers may be hesitant to engage with the chatbot if they are unsure about how their personal information will be handled, which could limit the program's effectiveness. To mitigate this risk, the team will adhere to strict data privacy and security protocols, ensuring compliance with relevant regulations including Chile's data protection laws as well as the IDB's Data Privacy policy. Regular security audits and risk assessments will be conducted to identify and address any potential vulnerabilities in the system.

6.4 To effectively address the concerns listed above and any that emerge during the project's lifecycle, the team will foster close collaboration with the government and ensure clear communication to all stakeholders regarding the objectives of the intervention. The team will further mitigate risks through regular missions, technical assistance, and a dedicated team.

6.5 In addition to the mitigation measures listed above, the RCT will be submitted for review and approval by the Institutional Review Board (IRB) of McGill University in Fall 2024, as the team has done in past projects, including similar ones that have deployed chatbot technology as part of an educational intervention. This crucial step ensures that the study adheres to ethical standards and protects the rights of human participants. Additionally, the research team will submit a pre-analysis plan to strengthen the study's transparency and methodological rigor.

VII. Environmental and Social Aspects

7.1 This TC does not have applicable requirements of the Bank's Environmental and Social Policy Framework (ESPF).