

The *Semillas Digitales* Program: Overview and Theory of Action

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Project Overview

Semillas Digitales (*Digital Seeds* in English) is a collaboration between the Seeds for Progress Foundation, the Mercon Coffee Group, CISA Agro and the Ministry of Education in Nicaragua, and the University of Pennsylvania Graduate School of Education (PennGSE) in the United States. *Semillas Digitales* is a school and community-based action research program that cultivates a holistic, sustainable, stakeholder-driven, capacity-building model of educational innovation focused on pedagogical and curricular enrichment, intensive inquiry-based professional development, technology integration, digital literacy and community partnership, all guided by an intentional focus on active collaboration and mutual capacity building and respect. Central to *Semillas Digitales* is the long-term, active support of educational stakeholders (administrators, teachers, students and parents) to facilitate the identification and construction of meaningful educational opportunities through expanded and supportive learning environments and pedagogical innovations that integrate Information and Communication Technologies (ICT) as pedagogical tools that support, reflect and drive broad innovation and improve the overall quality of education.

Semillas Digitales serves as a catalyst for collective participation and innovation among teachers, teacher supervisors, students and community members. Based on the idea that the primary goal of schooling is the integrated development of students (i.e., character, responsibility, critical thinking, solidarity, community consciousness), *Semillas Digitales* emphasizes the fostering of affective relationships and positive classroom environments in order to optimize the capacity for all stakeholders to learn, create and innovate within these supportive spaces. In this vision of education, the teacher facilitates learning through the strategic design of constructivist modes of teaching that leverage students' experiences by engaging students in the co-construction of dynamic learning environments instead of solely imparting knowledge on students through the delivery of concepts and information¹. To support this kind of critical and engaged teaching and learning, reflexive spaces of exchange (i.e., professional development sessions, teacher accompaniment meetings, and class-time) become invaluable opportunities for the educational facilitators from *Semillas Digitales* to directly support and work alongside students and teachers as the Program establishes roots, cultivates connections and collectively grows in communities in contextually relevant ways that are in harmony with each school and the community contexts that shape it.

Semillas Digitales has eight primary objectives, which are to:

1. Facilitate pedagogical and instructional innovation through the development and enactment of ongoing, teacher-driven professional development processes and one-on-one teacher accompaniment during planning, instruction and evaluation;
2. Promote a holistic educational model in which educational stakeholders co-generate spaces for learning and innovation with the teacher playing the central role of facilitating the conditions that foster the integrated development of students in harmony with their environment;

3. Improve the overall quality of schooling so that it contributes directly and comprehensively to the development and cultivation of students' specific content mastery and critical thinking skills, knowledge(s), attitudes and dispositions
4. Improve the communication, coordination and collaboration among administrators, teachers, students, community members and other educational stakeholders as a means to enrich the school environment, strengthen connections between school and community and optimize interactive learning and idea exchange;
5. Facilitate the exchange and application of methodological strategies (i.e., constructivism, differentiated instruction, blended and project-based learning, culturally relevant pedagogy) that develop reading, writing and mathematical skills and digital literacy with an emphasis on the first three grades of primary school;
6. Support the inclusion of data-based evaluation, decision-making and instruction through a comprehensive, rigorous and participatory Monitoring and Evaluation system;
7. Develop the practices, abilities, processes and conditions to integrate various ICT resources (i.e., laptops, PC tablets, Internet) into the educational environment and broader learning experiences of teachers, students and community members;
8. Establish and strengthen partnerships with and among the various educational communities and stakeholders as a means to build capacity, facilitate local community participation and improve Program sustainability in and across schools and communities.

As action research, the approach develops and evaluates the emerging Program simultaneously. The study of *Semillas Digitales* documents and examines the effects of the incorporation of a technology-enriched and culturally responsive curriculum combined with intensive teacher professional development in selected schools in mostly rural, coffee-producing communities of Nicaragua. Alongside educational specialists from the Seeds for Progress Foundation, the PennGSE team facilitates and studies the Program for implementation and replication purposes, including evaluating impact – on students, teachers, supervisory staff and community members – and the relationships between community contexts and the Program. The research documents how the implementation of *Semillas Digitales* influences: (1) school environment, culture and functioning; (2) student learning, skills development, performance and educational/professional aspirations; (3) teacher knowledge, pedagogical approach, performance and classroom evaluation; and (4) school, family and community relationships, communication and engagement.

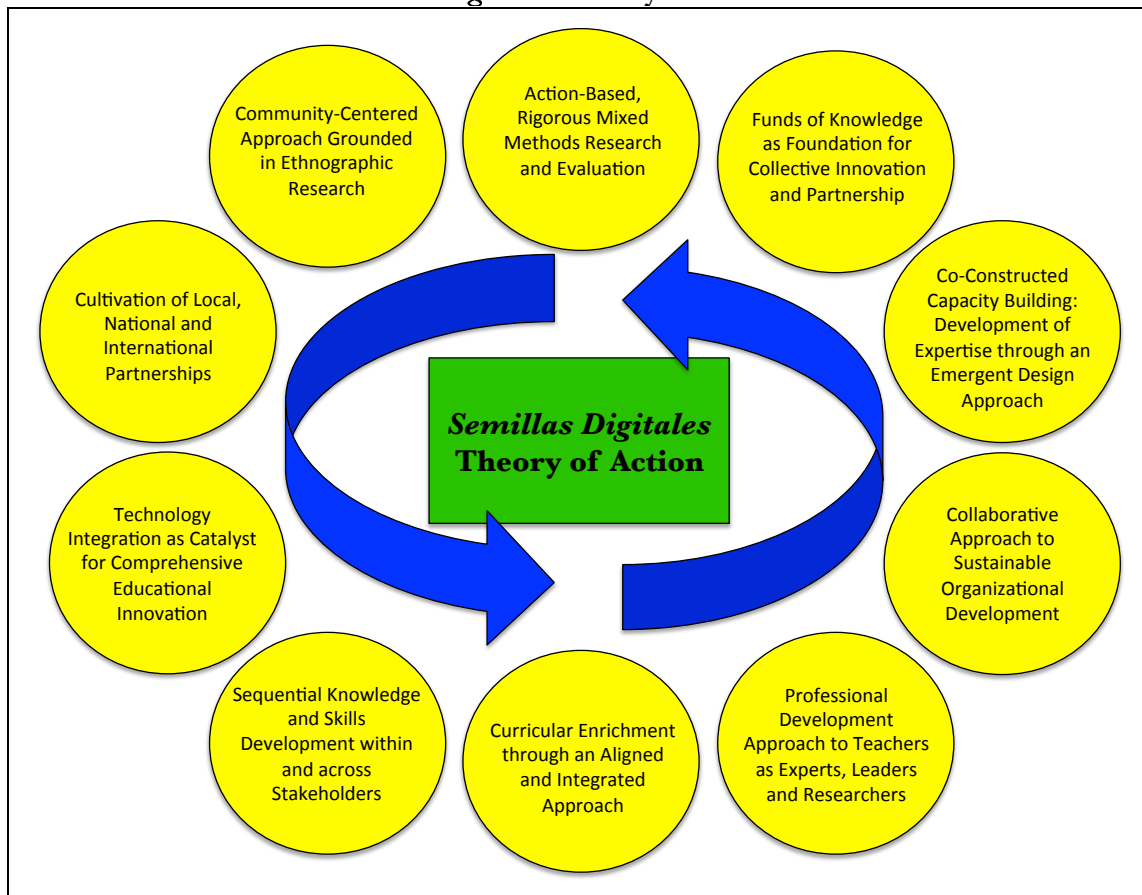
Semillas Digitales Theory of Action

Semillas Digitales, now in its fifth year, uses the integration of technology as a catalyst to innovate and enrich pedagogical practices, curriculum and learning; to enhance school organization and communication; to increase student engagement and community participation; and to improve the overall quality of education guided by an *emergent design*² approach. The Program seeks to enrich and expand students' skills in reading, writing and mathematics as well as their digital literacy, critical thinking skills and character development by engaging educators, students and community members in the co-construction of a personalized, contextualized and respectful approach to sustainable educational innovation and technology integration that purposefully incorporates local *funds of knowledge*³ within an emerging blended-learning environment⁴. This innovative model facilitates the stakeholder-driven development of teachers, students, administrators and community members as critically engaged and technologically savvy learners, leaders and professionals within a growing and interactive community of educational stakeholders.

Semillas Digitales works from a theoretical framework informed by post-colonial theories of development, constructivist theory, critical ethnography and participatory action research and is guided by the following principles and theories:

- (1) Community-Centered Approach Grounded in Ethnographic Research;
- (2) Action-Based, Rigorous Mixed Methods Research and Evaluation;
- (3) *Funds of Knowledge* as Foundation for Collective Innovation and Partnership;
- (4) Co-Constructed Capacity Building: Development of Expertise through an Emergent Design Approach;
- (5) Collaborative Approach to Sustainable Organizational Development;
- (6) Professional Development Approach to Teachers as Experts, Leaders and Researchers;
- (7) Curricular Enrichment through an Aligned and Integrated Approach;
- (8) Sequential Knowledge and Skills Development within and across Stakeholders;
- (9) Technology Integration as Catalyst for Comprehensive Educational Innovation;
- (10) Cultivation of Local, National and International Partnerships.

Table 1: *Semillas Digitales* Theory of Action



1. Community-Centered Approach Grounded in Ethnographic Research

An ethnographic research approach – which seeks to deeply engage with, understand and document perspectives, experiences, knowledge(s) and relationships in each community – serves as the starting point and foundational mode of engagement that informs and guides the development, implementation, monitoring and evaluation of *Semillas Digitales*. A systematic, ongoing collection and analysis of diverse

ethnographic data (e.g., interviews, focus groups, informal conversations, town hall meetings, home visits, classroom observations as well as community and school data) facilitates a collaborative and critical reflection on existing school culture, student experiences and teaching practices and supports broad pedagogical innovation and the creation, development and incorporation of an overarching educational model. The identification of and focus on leveraging human capital, funds of knowledge and local resources in each community enables a resource-oriented educational approach that is essential to maximizing the fit and sustainability of the Program. Guided by a participatory action research framework, the *Semillas Digitales* stresses the importance of partnership, collaboration and dialogic engagement with teachers, students, families and community leaders in the strengthening of relationships and communication between community, home and school. Specifically, the promotion of community involvement in education, and the school specifically, fosters increased bonds between school and community and facilitates a more culturally relevant and enriched content, curriculum and pedagogy while also improving student engagement, attendance, retention and community-school collaborations.

2. Action-Based, Rigorous Mixed Methods Research and Evaluation

Central to supporting, measuring and analyzing the Program is a rigorous Monitoring and Evaluation (M&E) system focused on the people, processes, results and impacts of *Semillas Digitales*. To measure outcomes and impacts on the various stakeholders there is ongoing, evidence-based support through direct monitoring combined with systematic evaluation and a broad dissemination of findings among stakeholders. Due to the intentional flexibility of an emergent design approach and the formative evaluation components of *Semillas Digitales*, improvements and adjustments are implemented on a real-time basis, thus constituting a true action research approach to educational innovation. Because of the need for in-depth, contextualized data as well as quantitative measures of student and teacher progress, the Monitoring and Evaluation system employs a mixed methods approach. Enriched by a strategic combination of both quantitative and qualitative research methods, instruments measure processes and results of various indicators related to students, teachers, community members, and the overall program which include: (1) program implementation; (2) attitudes, behaviors, and perspectives on education; (3) future aspirations (e.g., educational, personal and professional); (4) skills and knowledge development (e.g., digital literacy; skills in reading, writing and mathematics; critical thinking skills, and specific content knowledge); (5) participation, engagement and retention; (4) school leadership and management; and (6) communication, collaboration and coordination. Quantitative and qualitative methods support the implementation and progress of the Program through constant monitoring and evidence-based feedback while simultaneously constructing comprehensive, analytical and personal accounts of the Program's impact on stakeholders. Quantitative measures include surveys, questionnaires, school and national data, and ongoing reading, writing and mathematics skills assessments. Correlations between grades, attendance, digital literacy, skills development, and other variables are analyzed in order to understand the effects of the educational technologies, professional development, community participation and other elements of the project on school, teacher and student performance goals. Qualitative data sources include interviews, focus groups, informal conversations, home visits and classroom observations and are used to contextualize and deepen the quantitative data using descriptive analysis, direct accounts and personal narratives.

3. Funds of Knowledge as Foundation for Collective Innovation and Partnership

The *Semillas Digitales* model is built upon a systematic, relational and data-based exploration of and engagement with the local communities and educational stakeholders as means to identify and understand the diversity and depth of resources, skills, realities, contexts, histories, needs and knowledge(s). Ongoing community-based engagement and rigorous data collection seeks to ensure meaningful inclusion of stakeholders and provides the contextual foundation for the customized development of the Program,

including the co-construction of: (1) a revised, culturally relevant curriculum; (2) pedagogical innovation and performance assessment; (3) professional development themes, resource enhancement and areas for skills development; (4) school-community collaboration and engagement; and (5) overall approaches to reimagining the school culture and learning environment. By directly informing what constitutes appropriate, relevant and respectful curricular and pedagogical approaches and professional development strategies, local context, information and understandings shape every aspect of the Program. Alongside teachers, students, community members and educational stakeholders, the *Semillas Digitales* team collectively identify and facilitate the growth of the skills and areas of knowledge mastery required to implement an innovative, student-centered, data-based pedagogical model that resonates with existing resources and meets the needs of teachers, students and communities on a case-by-case basis. Further, these data help to link program strategy to the needs, interests, learning styles and cycles of the agricultural year thereby forming the contextual understanding necessary to develop culturally relevant curricular content (e.g., agronomy, community values and skills, as well as agricultural cycles that affect the community). Guiding the process is a consensus-based decision-making structure⁵ among the *Semillas Digitales* partners. These decisions inform the direction of the Program, systematize local participation and strengthen the overall partnership network.

4. Co-Constructing Capacity: Development of Expertise through an Emergent Design Approach

Communities and schools provide the context in and from which the Program and attendant evaluation are implemented. Informed by ethnographic methods, an emergent design approach enables the ongoing recognition and incorporation of local talent, skills, knowledge, resources and concerns into the structure, strategy and development of a sustainable educational program. Understanding the context and intricacies of the educational and broader community environment is essential to the creation, implementation and sustainability of a capacity-building approach, one that works from an engagement with and incorporation of local resources and needs in relation to educational development and innovation rather than from an impositional or deficit orientation. Central to the design of *Semillas Digitales* is the ongoing recognition and cultivation of stakeholder expertise and leadership through participation in multiple aspects of program design, development and implementation. Using a systematic, adaptable and flexible approach, stakeholders co-construct the professional development components, strategies to enrich learning experiences and the overarching educational environment, pedagogical innovation, and curricular enrichment aspects of *Semillas Digitales*. The Program is built upon a model of “customized replication” which requires systematic engagement with each community context as a means to consider, understand and integrate the rich particularities of communities and to co-construct a sustainable, contextually relevant and localized iteration of *Semillas Digitales*. This systematic incorporation of stakeholders’ perspectives and concerns in each individual community is indispensable to the sustainability, longevity and overall success of the Program.

5. Collaborative Approach to Sustainable Organizational Development

Central to *Semillas Digitales* is stakeholder-driven capacity building at multiple, intersecting organizational levels. Assessments of the organizational structures at the macro (company and university) and micro (individuals and groups of supervisors, teachers and support staff) levels, including an examination of their areas of overlap and intersection, is essential to co-constructing, with local players, a critical and progressive understanding of organizational structures, strengths, resources and areas of additional support. Engaging in a collaborative, stakeholder-driven, critical examination of organizational frameworks, processes, accountability structures and communication pathways drives collective problem-solving, interdependent responsibility and accountability, and overall program development in ways that are informed by a sophisticated, data-based, holistic understanding of organizational systems. As mentioned above, resource-oriented capacity building undergirds every stage of these dialogic and network

processes to ensure that learning and organizational growth are co-constructed and collectively determined, and therefore institutionalized and sustainable⁶. Moreover, a responsive, emergent design approach addresses immediate concerns, needs and circumstances without distracting from the longer-term goals and overall design of the Program. In sum, an actively collaborative approach cultivates and instills a shared set of principles, practices, processes and relationships that emphasize negotiation, communication, responsibility and accountability and promotes a shared organizational culture that permeates all aspects of the Program.

6. Professional Development and Support for Teachers as Experts, Leaders and Researchers

Semillas Digitales is built on the design and enactment of teacher ownership and leadership of program development and emergent curricular and pedagogical innovations. Teachers are experts on multiple levels, and their knowledge(s) and understandings of the national curriculum and specific educational contexts (i.e., students, school and community) are essential to the successful design, customization, implementation, monitoring, evaluation and evolution of the Program. In order to build and leverage teacher skills and expertise, it is imperative to co-construct the conditions, practices and supports that teachers identify as necessary for their professional development as well as the adoption of a pedagogical and professional stance as educational leaders and teacher-researchers. As they transition into the new role of teacher-researchers, it is vital to support teachers with the technical research skills and strategies necessary to critically evaluate and reflect on their experiences, approaches and pedagogies as well as examine the current educational environment as it relates to students' experiences, knowledge, learning processes, needs and overall progress. To create a sustainable, capacity-building model in which the teachers are centralized as facilitators and co-producers of knowledge (along with their students), the Program sequentially supports teachers in the process of pedagogical innovation and technology integration and in the development of in(ter)dependence and leadership roles within and beyond *Semillas Digitales*.

7. Curricular Enrichment through an Aligned and Integrated Approach

As a starting point, *Semillas Digitales* facilitates the integration of technology into the existing Nicaraguan Ministry of Education (MINED) curriculum for primary and secondary schools. During the lifespan of the project, technologies are adapted to the national curriculum established by the Ministry, resulting in a model that is aligned with national standards and appropriate for replication throughout the country. To fully integrate technology into the MINED curriculum, the development and critical review of daily lessons plans, objectives and interdisciplinary projects is essential because they constitute the building blocks (i.e., the activities and practices) of an overarching educational model and paradigm enriched by technology. Furthermore, a customized integration of existing and emergent curricular components with information and communication technologies (ICT) and educational technologies (e.g., strategies, pedagogy, practices) facilitates the incorporation of technology as a ubiquitous and fully integrated component of the learning environment. The primary goal of the curricular alignment and integration is to incorporate technology into the existing set of content and pedagogical approaches while simultaneously facilitating individual, collective and emergent innovation in the design and implementation of learning experiences and educational environments⁷.

8. Sequential Knowledge and Skills Development within and across Stakeholders

To build upon and enrich the understanding of existing content and practices as more complex and advanced understandings emerge, it is imperative to instill a collaboratively constructed, sequential approach to knowledge and skills development. Guided by an inquiry stance framework⁸, students and teachers engage in open dialogue around the roles, possibilities, affordances and challenges related to technology broadly and to the integration of technology in the classroom specifically. Following a critical

exploration of technology's role in education and learning, the learning turns to the basic skills and digital literacy associated with technology use. As time progresses, the focus shifts to enriched content knowledge; interdisciplinary, project-based learning and blended learning theory, and advanced technology skills. Transitions from basic to intermediate to advanced knowledge and skills mastery – at the teacher and student levels – are mapped out and guidelines are provided to help ensure the iterative scaling up – and evaluation – of knowledge and skills development over time. The generative interaction of knowledge (e.g., content and technology) and skills development (e.g., informational, communication, critical-thinking, problem-solving, synthesis) are facilitated, discussed, learned, tested and integrated into practice and learning in a sequential manner as a means to improve the connections and foundations between past, present and future knowledge and skills. It is through engaging in this sequential, iterative approach that existing knowledge and skills are examined and deepened as teachers and students continue to develop new skills and knowledge.

9. Technology Integration as a Catalyst for Comprehensive Educational Innovation

The focus on educational innovation in and beyond technology integration is central to the *Semillas Digitales* model. Innovation guides the development and implementation of new approaches to understand, assess and facilitate student learning, teacher professional development, teacher pedagogy, content enrichment, curricular alignment and technology integration. The model relies on the systematic integration of educational and information technologies (e.g., computers, PC tablets, Internet resources) as well as more emergent, critical and constructivist approaches to pedagogy with the goal of developing advanced digital literacy, critical thinking skills, analytical and communication skills, and content knowledge and understanding—all within an environment of care and mutual respect. As this relates to curriculum and teacher professional development, an innovation orientation is crucial to the continuous integration of meaningful and comprehensive engagement with teachers and to specific curricular enrichment. The *Semillas* model builds on the existing MINED curriculum through collective exploration and incorporation of the resources and needs of individual communities (in terms of knowledge, skills, history, culture and references) juxtaposed with regional, national and international advances in educational practices, theories and approaches to technology integration.

10. Cultivation of Local, National and International Partnerships

Building on post-colonial theories of development, critical ethnography, and participatory action research, *Semillas Digitales* works to cultivate strategic partnerships and generative dialogic engagement with multiple individuals and communities aimed at mutual capacity building, “reciprocal transformation”, shared beneficence and sustainability of learning. Within this broad range of relationships (e.g., local, regional, national, international), considerable attention is paid to fostering strategic partnerships among and across local, national and international organizations, institutions and individuals to facilitate a cohesive network of diverse entities in the realms of education, development and social impact (among others). The *Semillas Digitales* program frames research collaborations as multi-lateral exchanges that can foster authentic partnership and resource exchange and help individuals and organizations to cultivate an applied reflexivity and collaborative examination of the ways in which individuals and groups are engaged in “dialectics of mutual influence”¹⁰. In this model, local participation is intrinsic to developing sustainable educational programs, practices and policies. Concurrently, over time we have seen that non-local participation can also provide necessary perspectives as distance allows us to perceive and connect local developments across regions in relation to global discourses and models¹¹. It is through these relational networks that partners critically engage with and exchange expertise, knowledge, skills, experiences and practices and ultimately establish concrete ways to work together, support and challenge one another, consolidate activities and share resources. *Semillas Digitales* works from the belief that sustainable partnerships beget sustainable programs.

Thank you to the vast network of stakeholders and partners who have made this program possible and who continue to move it forward.

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³ Gonzalez, N., Moll, L.C., & Amanti, C. (Eds.). (2005). *Funds of knowledge: Theorizing practices in households, communities, and classrooms*. New York: Routledge.

⁴ Kerres, M. & De Witt, C. (2003). "A didactical framework for the design of blended learning arrangements." *Journal of Educational Media*, 28(2-3): 101-113.

⁵ *Collective Innovation-Decision* is defined as "the choice to adopt or reject an innovation that is made by consensus of the members of a system." (p. 28). Source: Rogers, E. (2003). *Diffusion of innovations* (5th Ed.). New York, NY: Free Press.

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¹⁰ Ibid.

¹¹ Tsing, A. (2005). *Friction: An ethnography of global connection*. Princeton, NJ: Princeton University Press.