Implementing a Coding Curriculum in Uruguay: Teachers Navigating Power, Autonomy, and Classroom Dynamics

Implementación de un currículo de programación en Uruguay: docentes frente al poder, la autonomía y las dinámicas del aula

Implementação de currículo de programação no Uruguai: os professores diante do poder, da autonomia e das dinâmicas na sala de aula

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Abstract

In the global effort to develop computational thinking and coding skills in children since the late '90s, this study examines the dynamics between second-grade teachers and their students during the implementation of a coding curriculum in public schools across two departments in Uruguay. Using narrative analysis, the findings are organized into three overarching themes to illustrate how power structures between teachers and students were negotiated and, in some cases, redefined while introducing new technology in the classroom. Seventeen teachers participated in 45-minute focus groups, sharing their successes, challenges, and strategies for navigating students' agency and demand for independence in their learning processes. Grounded in the Positive Technological Development (PTD) framework, this study highlights the value of flexibility in instructional approaches, encouraging teachers to further adapt lessons and respond to students' needs, pace, and preferences to foster inclusive, developmentally appropriate, and meaningful technology-rich environments. Additionally, these results underscore how technology serves not merely as a passive tool for instruction but as a means of self-expression, communication, and ownership of the learning journey once the power structures have become fluid and shared.

Keywords:
early childhood, programming, power, autonomy, agency, adaptation.

Resumen

En el marco del esfuerzo global por desarrollar el pensamiento computacional y las habilidades de programación en la infancia desde finales de los años 90, este estudio examina las dinámicas entre docentes de segundo grado y sus estudiantes, durante la implementación de un plan de estudios de programación en escuelas públicas de dos departamentos de Uruguay. A través del análisis narrativo, los hallazgos se organizan en tres grandes temas que ilustran cómo se negociaron y, en algunos casos, se redefinieron las estructuras de poder entre docentes y estudiantes al introducir nuevas tecnologías en el aula. Diecisiete docentes participaron en grupos focales de 45 minutos, donde compartieron sus logros, desafíos y estrategias para gestionar la agencia de los estudiantes y su demanda de independencia en los procesos de aprendizaje. Basado en el enfoque de Desarrollo Tecnológico Positivo (PTD, por sus siglas en inglés), este estudio destaca el valor de la flexibilidad en las prácticas pedagógicas, alentando a los docentes a adaptar aún más sus lecciones y responder a las necesidades, ritmos y preferencias de sus estudiantes para promover entornos inclusivos, adecuados al desarrollo y con una integración significativa de la tecnología. Además, los resultados subrayan cómo la tecnología no actúa simplemente como una herramienta pasiva de instrucción, sino como un medio para la autoexpresión, la comunicación y la apropiación del proceso de aprendizaje, una vez que las estructuras de poder se tornan más fluidas y compartidas.

Palabras clave:
primera infancia, programación, dinámicas de poder, autonomía, agencia, adaptación.

Resumo

No contexto do esforço global para desenvolver o pensamento computacional e as habilidades de programação em crianças desde o final dos anos 1990, este estudo examina as dinâmicas entre professores do segundo ano do ensino fundamental e seus alunos durante a implementação de um currículo de programação em escolas públicas de dois departamentos do Uruguai. Utilizando análise narrativa, os resultados são organizados em três grandes temas que ilustram como as estruturas de poder entre professores e alunos foram negociadas e, em alguns casos, redefinidas com a introdução de novas tecnologias na sala de aula. Dezessete professores participaram de grupos focais de 45 minutos, nos quais compartilharam seus sucessos, desafios e estratégias para lidar com a agência dos alunos e sua demanda por independência nos processos de aprendizagem. Com base no referencial do Desenvolvimento Tecnológico Positivo (PTD, na sigla em inglês), este estudo enfatiza a importância da flexibilidade pedagógica. Incentiva os professores a adaptarem ainda mais suas aulas às necessidades, ritmos e preferências dos estudantes, promovendo—— ambientes inclusivos, adequados ao desenvolvimento e com uma integração significativa da tecnologia. Além disso, os resultados ressaltam que a tecnologia não funciona apenas como ferramenta passiva de instrução, mas também como meio de autoexpressão, comunicação e apropriação da aprendizagem, à medida que as estruturas de poder se tornam mais fluidas e compartilhadas.

Palavras-chave:
primeira infância, programação, dinâmicas de poder, autonomia, agência, adaptação.

Introduction

The development of computer science (CS) education in elementary schools in Latin America has evolved considerably over the past few decades (UNESCO, 2023). Influenced by regional and global trends in education, technology, and policy, the integration of CS into elementary education became optional in the 1990s and early 2000s, as computers and internet access became more widespread. Initially, CS education in schools often focused on basic computer literacy, teaching students to use word processors, spreadsheets, and simple programming tools (Frick, 2020). Early government-driven initiatives frequently targeted specific schools, particularly in urban centers, to introduce basic computing infrastructure (Jara *et al*., 2018; Cofré *et al*., 2015).

With the increasing demand for tech skills in the job market and the growing recognition that computational thinking (CT) is essential for problem-solving and critical thinking, many countries in the region started incorporating programming and CT into middle and high school curricula (Tanner *et al*., 2015; Nores, 2020). As digital literacy became essential for the 21st century, many teachers, researchers, and policymakers advocated for introducing CS concepts earlier in a child's development, sometimes as early as preschool or kindergarten. This reflects the understanding that the cognitive, social, and emotional skills developed in the early years are critical for future learning and success, and that young children can engage with CT concepts in developmentally appropriate ways (Bers *et al*., 2022; Helm *et al*., 2023; UNESCO, 2023).

However, this shift requires an increase in professional development (PD) programs and curriculum development to change attitudes, beliefs, and practices toward including CS in elementary classrooms (Bers *et al*., 2013; Manches & Plowman, 2017). Previous research has shown how challenging this has been, as the technologies and pedagogies must include developmentally appropriate strategies to engage young students in learning complex CS concepts and skills, while providing ongoing support to help teachers feel confident in delivering this new content (Mason & Rich, 2019). In this context, this study explores how Uruguayan second-grade teachers effectively navigated challenges and built confidence while implementing a coding curriculum. Through narrative analysis, we examine teachers' experiences in negotiating power in the classroom as their roles evolved from authoritative instructors to facilitators or guides leveraging students' technology expertise.

Literature Review

Power, Agency, and Classroom Dynamics

Student agency—the capacity to take responsibility and ownership over thinking, discussing, and problem-solving—is fundamental to learning processes, especially in the development of computational thinking (Mameli *et al*., 2020). This involves formulating problems and solutions in ways that a computer can understand, encompassing cognitive skills such as decomposition, pattern recognition, abstraction, and algorithmic thinking (Wing, 2006, 2011; Yadav *et al*., 2018). These skills

are essential for CS-related activities but also across domains. This highlights the importance of active student participation and exploration, both of which demand a high level of personal agency. However, allowing and encouraging student agency in the classroom often leads to tensions between the autonomy students may seek and the teacher's authority in this process (Millei, 2012).

Encouraging agency involves empowering students to make choices, explore their interests, and engage in self-directed learning, which promotes creativity and independence (Von Duyke, 2013). Teachers, on the other hand, must also ensure that students achieve curriculum objectives, master essential skills, and meet standardized outcomes, often requiring oversight and structured strategies (Millei, 2012).

This balance can be difficult to maintain. Too much flexibility may heighten teachers' concerns about potential knowledge gaps or classroom management issues, while students might interpret such oversight as a constraint on their creativity and independence (Millei, 2012).

Building on Bandura's (2006) social cognitive theory, agency is not simply an individual trait but a dynamic interplay between personal capabilities, social interactions, and the larger context in which individuals operate. He identifies three interconnected levels at which human agency develops: personal, social, and collective.

At the personal level, agency involves students' self-regulatory capacities, including organizing their actions, evaluating their progress, and reflecting on their learning. At the social and collective levels, it is shaped by the cultural and social contexts in which it unfolds. While students may have individual goals, thoughts, and actions, these are inevitably influenced by broader sociocultural norms and classroom interactions (Gee, 2021), which in turn affect the roles and positions each person holds (Fu & Clarke, 2019).

The traditional view of power emphasizes a hierarchical, top-down structure in which the teacher influences or controls the behavior of others, resources, or outcomes (Rogers, 1974). Under this model, rules, expectations, and procedures are imposed, limiting student choice and voice. Students are typically expected to comply with the teacher's instructions and adhere to pre-established curricular goals and methods, leaving little room for self-directed learning or risk-taking in exploring new ideas (Lee & Kim, 2019; Crowhurst & Cornish, 2020; Stolp *et al*., 2020). While structured, this classroom culture can undermine students' motivation, curiosity, and agency as they focus more on following instructions than on actively contributing to the learning process (Ostroff, 2016).

In this context, teacher authority is often seen as a force that stifles student agency, autonomy, and critical thinking —skills that are crucial for fostering computational thinking (Siegfried, 2021). This tension could be critical in designing CS classroom interventions because teachers must provide students with the space to explore, question, and drive their learning while still meeting curriculum standards and ensuring they achieve specific outcomes (Pollock & Tolone, 2020).

Despite these tensions, it is essential to recognize that teacher authority does not have to conflict with student agency. A shift in how teacher authority is conceptualized and enacted can help bridge this gap (Pirrie & Rafanell, 2020). When viewed through Foucault's conceptualization of power—as a relational, dynamic, and omnipresent

force—the student–teacher relationship can be understood as a continuous interaction of power (Foucault, 1978; McLean, 2016; Robertson, 2024).

This interaction revolves around producing, exchanging, and disseminating knowledge, with students and teachers engaging in and reshaping the power dynamics within the educational context. Through this lens, classrooms can become spaces of shared knowledge production, where students are encouraged to contribute their perspectives and experiences, thereby shifting traditional top-down structures (Robertson, 2024).

Furthermore, Foucault's framework transforms students from passive recipients into active participants, capable of reshaping classroom dynamics and beyond. Rather than a dominating force, teacher authority can be reimagined as a supportive presence that encourages exploration, independence, and critical thinking skills (Baker *et al*., 2017). This relational view of power also challenges rigid hierarchies, empowering students to question norms, engage in critical dialogue, and resist practices that may constrain their growth (Cornelius & Herrenkohl, 2004; McLean, 2016). Ultimately, Foucault's idea that power inherently generates resistance emphasizes how students can actively exercise their agency—manifested, for example, in their advocacy for more meaningful learning experiences that reflect their needs and interests (Cornelius & Herrenkohl, 2004; McLean, 2016; Robertson, 2024).

Under this premise, effective teaching may involve negotiating these dynamics and finding a balance where students feel empowered to take ownership of their learning while benefiting from the teacher's expertise and guidance. This requires teachers to relinquish some degree of control and adopt a more facilitative and adaptive role in the classroom, which is crucial for creating student-centered, process-focused classrooms that foster environments where students and teachers engage in meaningful, dynamic learning (García-Moya *et al*., 2019; Pirrie & Rafanell, 2020).

Positive Technological Development (PTD) Framework

The Positive Technological Development (PTD) framework, developed by Bers (2006, 2010, 2012, 2020), is a research-based framework designed to integrate technology into elementary education in ways that holistically support children's cognitive, social, and emotional development. Informed by the Positive Youth Development (PYD) framework (Lerner *et al*., 2005), PTD offers children opportunities to take risks, discover, imagine, explore, and create meaningful projects using technology. It advocates for engaging children in complex tasks that require critical thinking, planning, reflection, creativity, self-expression, and, most importantly, agency.

Central to PTD is the idea that when technology is used thoughtfully and intentionally, it can transform children from passive consumers into active and responsible contributors to society, while emphasizing the value of collaborative learning (Bers, 2010).

Grounded in Seymour Papert's constructionist theory, which emphasizes the unique metacognitive learning opportunities afforded by computer programming (Papert, 1980), PTD builds on the idea that children learn best through hands-on, meaningful engagement with technology, fostering positive, lifelong skills and values. The

framework highlights six core behaviors, communication, collaboration, community building, content creation, creativity, and choices of conduct, as essential for fostering positive learning environments that are developmentally appropriate, inclusive, and culturally relevant. Guided by the 'coding as a playground' metaphor, PTD emphasizes that technology can be a powerful medium for young learners to explore and express their ideas, interests, and emotions (Bers, 2020). Like a playground, which fosters social, cognitive, and physical development through unstructured play, coding environments allow children to engage in open-ended problem-solving, imaginative exploration, and self-expression.

Agency and Power Negotiation in a Technology-Rich Environment

In a technology-rich classroom, a facilitator can provide students with tools for coding, creating, and collaborating while allowing them to take ownership of their projects (Fonkert, 2010). For instance, in a coding project, students may choose what they want to design, making decisions about the content, structure, and design (Romiszowski, 2016). In this context, the teacher acts as a mentor, offering scaffolding and guidance as needed, reinforcing students' agency and negotiating their role as a supportive guide rather than a controlling authority (Stroupe, 2014).

Under the PTD theoretical framework premises, this shift aligns with the idea that teachers foster a constructionist approach to the use of technology (Bers *et al*., 2018). Similarly to caregivers in a playground, teachers should guide students in making decisions, reflect on the role they assign to technology, and encourage them to consider the impact of their work on others,—particularly in collaborative settings—, without taking over the experience for them. The PTD framework makes teachers adapt their traditional roles while students are encouraged to make decisions independently and explore technology-driven projects (Bers *et al*., 2018).

In this scenario, students may work in teams, negotiate roles, and collectively design a project using technology, shifting how the power hierarchies are structured in the classroom as the teacher authority becomes less about dictating specific tasks and more about supporting students in setting goals and understanding the social consequences of their work (Romiszowski, 2016). This approach may support student agency by empowering them to take ownership of their learning processes and negotiate roles based on their knowledge and skills development. Such as redistribution of authority disrupts traditional power hierarchies, placing students at the center of the learning experience and giving them a greater sense of control and accountability (Stroupe, 2014; Romiszowski, 2016).

Teachers may find themselves negotiating new forms of power-sharing in classrooms where technology is used to foster agency (Nelson, 2014; Higgins *et al*., 2019). Power no longer resides solely in the hands of the teacher but is distributed among students as they take control of their learning process. In the context of coding, students might encounter challenges that require them to work together and solve problems autonomously (Higgins *et al*., 2019). Teachers support these efforts by helping students reflect on their actions, providing guidance when necessary, and offering constructive feedback rather than exerting top-down authority. In this sense, teacher authority in a classroom guided by the PTD framework is reimagined

as co-authority, where the teacher shares power with students, giving them more control over their learning experience while still guiding and supporting them in achieving learning goals. This co-constructed learning environment supports the development of student agency and the skills needed to use technology ethically and collaboratively (Bandura, 2006).

Integrating student agency, teacher negotiation of power structures, and the PTD framework creates a classroom environment in which students become empowered creators and problem-solvers. As teachers shift from traditional authoritative roles to more facilitative ones, they encourage students to take ownership of their learning, make ethical decisions, and collaborate effectively. In this way, technology becomes a tool for cognitive development, social responsibility, and moral awareness, aligning with the principles of PTD while reshaping traditional classroom power dynamics.

Background

The Programming Language

ScratchJr is a free developmentally appropriate digital application that introduces children aged 5 to 7 to basic programming concepts through color-coded, puzzle-like blocks (Bers & Resnick, 2014; Blake-West & Bers, 2023). This playful environment invites children to explore freely and take risks in an interface that allows them to add, edit, and create many characters and backgrounds to tell original stories, express themselves, and collaborate with peers in the classroom. Through this application, children create connections between artificial and natural languages, as concepts like syntax and semantics can be transferred from one another, enabling young learners to express themselves with technology in ways comparable to using the alphabet (Flannery et al., 2013).

The Coding Curriculum

The premise of the Coding as Another Language (CAL) pedagogical approach and curriculum is that coding is a literacy for the 21st century, and, as such, it can borrow strategies used in other literacies (Bers, 2019). Alphabetical literacy enables people to represent and interpret ideas through texts that can travel away from immediate contexts and still be understood by people (Vee, 2013). Similarly, algorithms allow people to represent ideas through computer programs interpreted by a computer or a robot. This creates connections between coding, reading, and writing, as both coding and literacy require problem-solving skills to manipulate language so that a symbolic representational system becomes a shareable and interpretable product.

Based on the PTD framework (Bers, 2006), the CAL curriculum presents powerful ideas of CS in conversation with powerful ideas of literacy, allowing students to learn a programming language to create meaningful projects express themselves, and reflect on their thinking. Seymour Papert's concept of "powerful ideas" refers to fundamental concepts that enable individuals to think in new, transformative ways (Papert, 1980). These ideas are not confined to specific content areas but serve as tools for thinking that can be applied across multiple domains. Papert believed

powerful ideas can change how people understand the world and engage with new knowledge, providing innovative ways to approach challenges and solve problems.

Through twenty-four 45-minute lessons, the CAL curriculum uses the free ScratchJr programming language to engage children in pre-kindergarten, kindergarten, first grade, and second grade in both plugged activities—such as creating interactive projects in ScratchJr—and unplugged activities, including read-alouds, singing, writing journals, and using crafts and recycled materials to practice computer science concepts away from the screen. The curriculum's structure (Figure 1) progressively introduces new coding concepts, offering multiple opportunities for children to design and code personally meaningful projects, interact with others, and grow socially and emotionally by learning to use a programming language for expressive and communicative purposes (Bers *et al*., 2023).

Methods

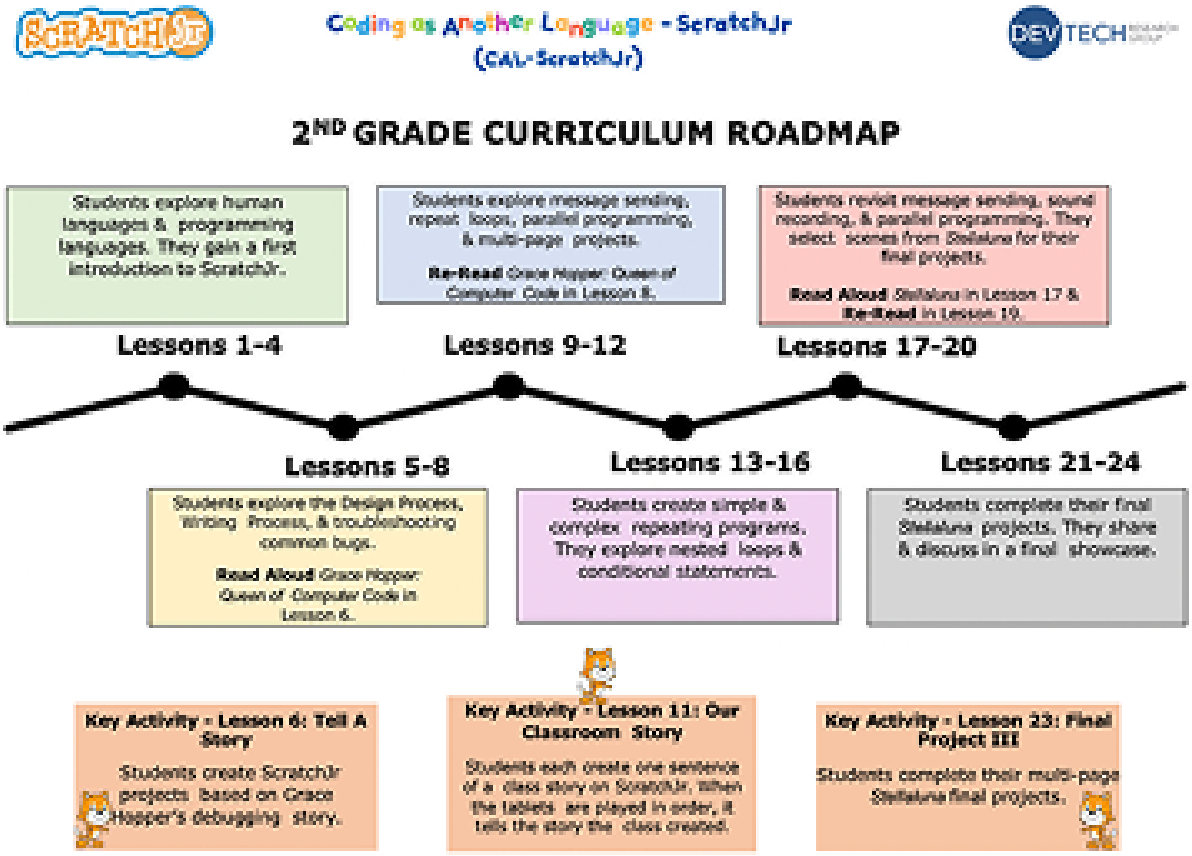
The Intervention

Coding as Another Language (CAL) is a school-based program designed to help teachers and students build self-efficacy, confidence, and readiness to teach and learn CS concepts, including coding skills and computational thinking. Its goal is to enhance teaching practices and deepen CS knowledge fostering a supportive, engaging, and nurturing environment for young learners' growth. By focusing on computational thinking, coding, literacy, and socio-emotional development, the intervention provides elementary school teachers with the training and resources needed to implement the CAL curriculum in their classrooms, in addition to preparing them to further adapt the lessons during the instructional time.

The CAL intervention uses a randomized controlled trial (RCT) design, with teachers and their students randomly assigned to either a control or a treatment group to assess the impact of the intervention. As part of this study, teachers in the treatment group completed a series of validated assessments before, during, and after the training and curriculum implementation. However, for this analysis, we focus solely on the analysis of focus groups conducted during and after implementing the CAL curriculum. This approach allows for a deeper exploration of teachers' experiences, perspectives, and insights related to the specific aspects of this article (Figure 2).

Figure 1

Grade 2 CAL Curriculum Road Map

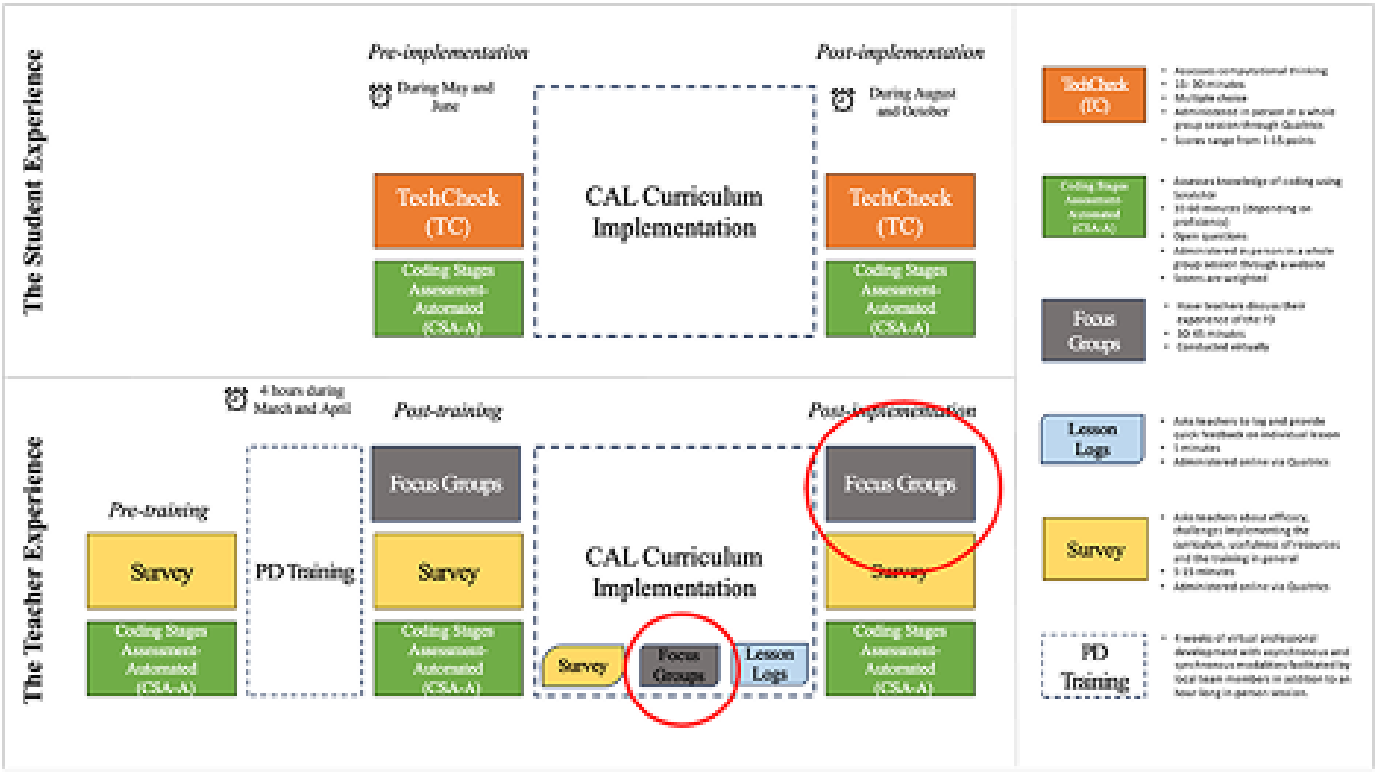


Sample

For this analysis, the study sample consisted of 17 treatment-group teachers participating in the CAL curriculum implementation. All participants identified as women, with teaching experience ranging from two to thirty years, and reported that this study was their first experience exploring, learning, and teaching coding concepts. These teachers were trained to deliver an abbreviated version of the CAL curriculum, translated into Spanish for a previous intervention in Argentina. All ethical guidelines were strictly followed during implementation and analysis, with all participants providing informed consent after being fully briefed on the study's protocols, potential risks, and their rights.

Figure 2

Study Desing



Data Collection

Data were collected between March and June 2024 through four virtual focus groups conducted during and after the curriculum implementation. Each focus group included eight or nine participants, was conducted in Spanish, and was translated into English by a U.S.-based research team member who was a native Spanish speaker. The focus groups lasted approximately 45 minutes and were facilitated by a member of the local implementation team. They followed a semi-structured interview protocol developed collaboratively by the local and US-based research teams.

Data Analysis

Narrative analysis is the chosen method for understanding the complex accounts of teachers' negotiation of autonomy while implementing the CAL curriculum (Willis, 2019; Andersen, 2015). The analysis will be organized around three main themes that emerged from the semi-structured protocol used to conduct the interviews: Student Motivation and Engagement, Collaboration and Peer Learning, and Teacher Adaptation and Flexibility (see Table 1). These themes were used to make sense of the recurring patterns and insights across the teachers' narratives. Through these themes, we can better understand how teachers perceive their roles in the coding classroom during the implementation of the CAL curriculum and the meaning they assign to shifts in power hierarchies. Using pseudonyms to protect teachers'

identities, these narratives will help illuminate the complex and diverse factors influencing teachers' decision-making and adaptive strategies in technology-driven instruction.

Table 1

Themes guiding the analysis

Theme	Definition
Student Motivation and Engagement	How giving students control over their learning pace and difficulty impacted their intrinsic motivation, interest in learning, and overall engagement with technology-driven activities, allowing them to succeed in many ways.
Teacher Adaptation and Flexibility	Strategies teachers used to adapt to new classroom dynamics, such as management, assessment, and instruction, with a focus on being more responsive to shifts in power structures.
Peer Collaboration and Learning	Strategies teachers used to promote peer collaboration and learning as students took more ownership of their pace and complexity of tasks, and how this affected their understanding and mastery of technology-driven activities.

Negotiating Power Structures Through Technology

The narrative analysis of the two focus groups with seventeen second-grade teachers revealed several key themes related to their experiences and their students' growth. A prominent theme was student motivation and engagement, with all teachers noting their students' enthusiasm and how encouraging that attitude was for them. For example, Ms. Rivera (pseudonym) recounted during a mid-implementation focus group: *"Every morning, my students would rush into the classroom asking if we would work on ScratchJr that day. They loved working with it and wanted to do it all the time."*

As Ms. Juarez's (pseudonym) experience illustrates, students' motivation extended beyond classroom activities, with some even continuing to work on the app at home. *"Some of my students have even explored the app at home, discovering many things they share in the classroom… moving faster than me, but that is how excited they are with this app!"*

In addition, teachers shared that technology integration in the classroom emerged as a transformative experience for them as professionals, particularly in its ability to create opportunities for all students to succeed, including those who traditionally struggle with academic tasks. Ms. Juarez reflected on this, noting:

> Due to the students' motivation with the app, they are now more engaged in the activities they have to do, and they have fun and do not want to stop doing it. Now, I am impressed that they can do their work and feel great about it.

This sense of empowerment also reshaped teachers' perceptions of their students, underscoring a profound shift in classroom dynamics, where students who had previously experienced barriers to success could now engage with learning in a meaningful and empowering way.

Witnessing students who had usually struggled succeed led teachers to celebrate and reflect, reinforcing their belief in the potential of all students to thrive when provided with the right tools and support to foster engagement and motivation. The teachers' observations highlight the transformative impact of the CAL intervention in fostering student agency, engagement, and motivation, as students were no longer passive participants completing assigned tasks but instead showed genuine eagerness to learn, actively engaging with the materials and the technology. This sense of ownership over their learning process was evident in how they approached challenges, demonstrating creativity, problem-solving skills, and persistence.

The curriculum implementation created an environment where students felt empowered to explore, ask questions, and take initiative, shifting the focus from task completion to a deeper, more reflective engagement with the content. In direct relation to students' engagement and motivation, all teachers mentioned that their students often outpaced their own understanding of the technology, at times making them feel frustrated but also willing to adapt their lesson plans and become more flexible. Teacher adaptation and flexibility is another key finding of the analysis, which focused on the strategies teachers used to adjust to new classroom dynamics and respond to shifts in power structures.

On this point, Ms. Juarez shared:

> They [the kids] jumped ahead and wanted to do more things, so I had to say, no, wait, that is for later, so they do not move on from what I wanted to do that day. But I had to stop them. Otherwise, they would have started exploring and doing things I cannot explain yet.

Similarly, Ms. Rojas (pseudonym) expressed discouragement when she could not fully answer her students' questions, echoing what other participants had shared. *"Sometimes it is oneself who is discouraged, perhaps, or does not know the topic very well,"* she admitted:

> They ask me things, but, luckily, they help each other solve them because I do not know everything about it. For example, if they finish an activity but others have not, they start exploring other things in ScratchJr, so they learn, like self-taught, or help each other when someone does not know something. I do not know everything they can do on the app.

Despite these challenges, she noted how empowering it was for her students to take ownership of their learning and how meaningful it was for her to navigate changes in classroom power dynamics.

These experiences reveal a dynamic interplay between traditional authority structures and students' emergent agency while engaging with technology. Building on Bandura's social cognitive theory, agency here is understood not as an individual trait but as a dynamic interplay fueled by peers' excitement. This tension can also be examined through Foucault's conceptualization of power, which suggests that power is not merely a top-down force but is distributed throughout a network of relationships. In this context, power is not simply something teachers wield over students but a fluid force that circulates within the classroom as students interact with their peers and the technology.

Teachers like Ms. Juarez and Ms. Rojas, for example, found themselves in a position where their students were not only surpassing their technical knowledge but were

also taking the lead in directing their learning process, challenging the teacher's power. However, this disruption of the teacher-student power dynamic, though uncomfortable, also gave rise to new forms of power and authority within the classroom. As teachers stepped back to allow students to take the lead, they created space for them to exercise agency, autonomy, and choices of conduct, empowering them to act as experts and shifting the classroom environment into one of collaboration and mutual learning.

Ms. Rojas also acknowledged that students' self-directed problem-solving and peer-to-peer teaching demonstrated emerging leadership and fostered an environment of shared authority. In this way, power within the classroom became more decentralized, with students exercising agency not only in their learning but also in shaping the direction of the class. In this context, the teachers initially tasked with introducing students through structured activities to coding had to adapt their lessons because of the students' enthusiasm and outpacing.

Ms. Fernandez's (pseudonym) example describes how the students' excitement over a play they had watched led them to recreate the play's story using ScratchJr but made her change her original plans:

> We had to change the lesson and do something the kids wanted to do because they were very excited about a play we watched, so they wanted to continue working on that and recreate it on ScratchJr. Instead of using the suggested books, they wanted to work on the play. They did it very quickly and were very creative, changing the characters and imagining new ends for the story that we had to let them continue working on it.

This example demonstrates a clear shift in power from the teacher as the sole decision-maker to the students guiding the learning process. Although the teacher initially had a structured plan, the students' requests prompted a revision of the activity. Ms. Fernandez acknowledged that allowing the students to lead the project's direction was rewarding, as they became deeply invested in the process. This narrative once again illustrates the decentralization of authority in the classroom, where students take on more active roles in directing their learning. The teacher's decision to adapt to the students' interests reflects a shift from traditional top-down authority to a more student-centered model.

On the other hand, Mr. Matrisciano (pseudonym) also observed:

> By letting the kids explore freely, they also engaged in more collaborative practices. For example, my classroom did not have enough devices for all the students, but that was not a problem because they shared and taught each other, creating projects together. Additionally, this led us to debug together, as a class, and find solutions to programs we could not figure out individually.

This observation illustrates the third theme of the analysis—peer collaboration and learning—, which highlights how students explore and promote a sense of ownership in the learning process by working together. Driven by curiosity and the need to overcome obstacles, students found strength in collaboration, turning the lack of sufficient devices into an opportunity to promote teamwork.

Informed by the PTD framework, technology is not only a tool for individual learning but also a medium through which students can work together to solve problems, create projects, and build social connections. Collectively solving problems or debugging is an example of how PTD encourages students to become solution seekers and

practice interpersonal skills, such as collaboration, communication, and community building. Ms. Carvallo (pseudonym) also shared about these changes in the classroom dynamics and the need to become more flexible to foster her students' collaboration:

> We had everything ready to work on a book from the curriculum, but they wanted to do something else, they wanted to work together, so we adapted the lessons for them so they could create their stories using the app in small groups.

Here, the students' interests and preferences directly influenced the lesson's structure, highlighting how teachers' roles evolved from authorities to facilitators. Adapting the lesson in response to student agency redefines the traditional power hierarchy and highlights how the classroom can become a more fluid, student-driven space. The PTD framework is closely aligned with these teachers' experiences, where technology is used for academic learning and promoting positive development, including agency and social-emotional skills. By allowing students to create the projects they wanted, Ms. Rivera, Ms. Rojas, Ms. Fernandez, Ms. Matrisciano, and Ms. Carvallo facilitated an environment where students could engage deeply with content, express their ideas, collaborate, and grow.

Adapting the lessons to student interests in collaborative environments also underscores the PTD framework's emphasis on providing developmentally appropriate and inclusive learning experiences that respect and respond to students' passions. The teachers' reflections also reveal how their teaching practices shifted in response to student agency by incorporating students' interests into the activities and providing them with opportunities to connect deeply with the material, encouraging intellectual curiosity and emotional investment.

Conclusion

In conclusion, the negotiation of power structures between teachers and students observed in this study exemplifies the dynamic and relational nature of power defined by Foucault. Rather than a fixed authority imposed by the teacher, power in this context became fluid, enabling students to assert agency through their high levels of engagement and motivation, sometimes outpacing the teachers' lesson plans and coding skills. By recognizing and responding to the students' interests, levels of motivation, and needs, teachers effectively redistributed power in the classroom, allowing students to take an active role in shaping their learning experiences and making the classroom a shared learning space where teachers and students collaboratively explore coding and technology.

From the perspective of the PTD framework, this negotiation aligns with its emphasis on fostering inclusive, developmentally appropriate, and meaningful technology-rich environments, advocating for a learning process that ensures that technology is a means for self-expression and communication rather than a passive tool for instruction. The teachers' strategies to adapt lessons and activities to align with students' interests demonstrate a commitment to these principles. By doing so, they maintained high levels of engagement and created opportunities for all students to experience technology as a tool for creative problem-solving, computational thinking, and personal expression. The implications of these adaptation strategies create a more accessible and engaging pathway into the coding classroom, which is

especially important in elementary education, where early experiences with CS can shape students' long-term attitudes toward technology.

Notes:

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Francisca Carocca P.: conceptualization, data curation, formal analysis, methodology, visualization and writing (original draft preparation, review and editing).
Marina U. Bers: conceptualization and data curation.

Availability of data:
The dataset supporting the results of this study is available under restricted access on the Boston College server.

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