

Localizing the Coding as another Language: ScratchJr Curriculum Through the Culture Based Model Framework

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Abstract: This article proposes a framework for designing and implementing a curriculum that develops coding and literacy skills in children ages 5 to 8 using the ScratchJr App worldwide. The Coding as Another Language (CAL) for ScratchJr curriculum is a pedagogical resource developed by the DevTech Research Group to teach computing to young children expressively and creatively and to prepare educators to cultivate positive and effective knowledge constructions using a symbolic representation system. In this study, the CAL curriculum is utilized by different organizations worldwide, all of whom create their unique adaptations and expansions, exemplifying the process of developing culturally responsive pedagogical resources.

Introduction

To prepare children for global citizenship and cultivate positive relationships with technology, we must work to increase the availability of research-based and developmentally appropriate learning resources worldwide. One universally available tool designed to meet the developmental needs of young children in the context of CS education is ScratchJr. Developed by the DevTech Research Group and Scratch Foundation, it aimed at teaching programming to young children in an open-ended, expressive way (Bers & Resnick, 2015; Blake-West & Bers, 2023). There is also a need to explicitly conceptualize early childhood computer science pedagogical approaches. The Coding as Another Language (CAL) pedagogy and curriculum developed by the DevTech Research Group account for these needs (Bers, 2019; Bers et al., 2023a). Based on the principle that learning to program, CAL involves using a new language (a symbolic representation system) for communicative and expressive functions, connecting the disciplines of coding and literacy. In addition to the mentioned needs, educational materials and frameworks must be culturally and linguistically responsive to cultivate positive and effective knowledge constructions, given the interdependence of learning, language, and culture (Gay, 2000; Scanlan et al., 2019). Continuing these efforts, the DevTech Research Group, with the support of the Scratch Foundation, co-developed a Special Interest Group (SIG) within the Scratch Education Collaborative (SEC) focused on the Coding as Another Language curriculum for ScratchJr (ScratchJr-CAL SEC-SIG). This two-year collaborative experience for nonprofit educational organizations is dedicated to extending computer science, computational thinking, and coding skills in local contexts to promote equity and social justice. In this paper, through three case studies, we examine how localization of the CAL-ScratchJr curriculum can be understood through the Culture Based Model Framework (CBM) (Young, 2009) to create a globally accessible repository of coding resources and to answer: How did participating organizations integrate cultural and linguistic elements into the CAL Curriculum to address their local communities' needs?

Theoretical framework

The CBM Framework (Young, 2009) aims to provide researchers and practitioners with guidelines for creating culturally responsive learning resources. This paper seeks to understand how this framework can inform practices within the learning sciences by adapting the CAL Curriculum - an open-ended, constructionist resource (Papert, 1980) in different educational settings. The CBM framework outlines a process for curricular designers to create an informed and effective curriculum that responds appropriately to learners' contextual, cultural, linguistic, and psychological needs. In this research, we examine the localization of the CAL- ScratchJr pedagogy and resources worldwide through the lens of this framework. CBM consists of eight focus areas: Inquiry, Development, Team, Assessments, Brainstorming, Learners, Elements, and Training (Young, 2009).

Case studies

The CAL-ScratchJr SEC-SIG organizations chose one of the following participation paths: Learn & Teach, Adapt & Translate, and/or Research & Evaluate. Across these paths, we have observed different ways in which the adaptation and expansion of coding curricula and practices have led to stronger human connections within and across organizations.

TeachCAL in New York

Partners at an educational organization in New York State chose the Learn & Teach path. They used the TeachCAL module, a free asynchronous online professional development course, to introduce teachers to the CAL pedagogy and curriculum. Based on TeachCAL, they relaunched a PD series for K-2 teachers to integrate ScratchJr into their compulsory curriculum. In addition, this team created a 16-hour PD experience to onboard 13 college PreK-2 teaching faculty with content knowledge and shared pedagogy embedded in the CAL curriculum.

CAL curriculum in Greece

An example from the Adapt & Translate path was the partner organization from a university in Greece. After months of work and following the CBM elements of Brainstorming, Learners, and Elements, the local partners learned to use the CAL resources. Led by a researcher, the team at the University of Crete worked for months to translate the curriculum into Greek. They created new books to bring together cultural, linguistic, and pedagogical elements from Greece while introducing students to coding concepts and literacy skills in their native language.

CAL implementation in Uruguay

The third path, Research & Evaluation, was followed by a non-profit organization in Uruguay. Through their computational thinking program, they aim to integrate computer science from an early age into public education, addressing topics related to computer science playfully and systematically and providing strategies for learning and teaching to early childhood educators. This organization localized the TeachCAL module by including its framework to educate more than 1,000 elementary school teachers. The course consisted of 120 hours of theoretical and didactical modules, three synchronous meetings with tutors through participation forums, and surveys regarding self-efficacy, confidence, and satisfaction measures administered pre-and post-training. This study allowed collaborative data collection and analysis between the local partner and DevTech, strengthening the reach, impact, and reproducibility of the CAL pedagogy in Latin America and allowing us to deeply assess the curriculum's effectiveness in new contexts.

Conclusion

In conclusion, through the work with ScratchJr-CAL SIG following the CBM framework, participating organizations successfully adapted the CAL Curriculum and resources in various novel ways. This intervention utilized coding education to connect culture, societies, and languages and make informed decisions on implementing pedagogical resources in contexts other than those in which the theory was developed. With the support of partner organizations worldwide, we can learn about the specific needs of each context, adapt resources culturally and linguistically, and train teachers while establishing connections between SIG members through the shared practice of cultural adaptation.

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