

BOOK REVIEW

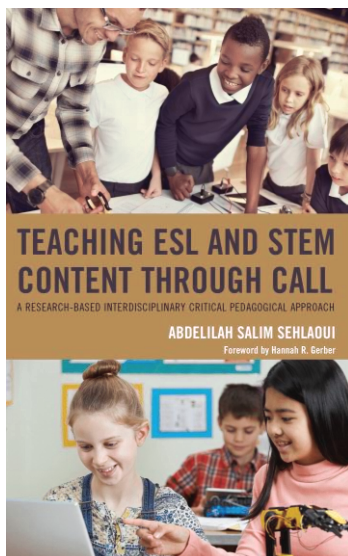
Teaching ESL and STEM Content Through CALL: A Research-based Interdisciplinary Critical Pedagogical Approach

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Teaching ESL and STEM Content Through CALL: A Research-based Interdisciplinary Critical Pedagogical Approach

By Abdelilah Salim Sehlaoui

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Review

There are many opinions of what Science, Technology, Engineering and Mathematics (STEM) Education consists of and how it should be taught, but what we all agree on is that today's world is complex, and citizens must be prepared with a new set of core knowledge and skills to draw data together and to interpret information coming from a wide range of printed and digital media.

Teaching and learning STEM helps develop these skills and prepare students for a present and a future where they will most likely succeed if they know how to use these skills and what to do with that knowledge. Therefore, high quality STEM teaching is becoming increasingly acknowledged as a key driver of opportunity, as stated by Tanenbaum (2016). On the other hand, critical understanding of the context is crucial in STEM Education, and it is also fundamental for the integration of STEM in Computer-Assisted Language Learning (CALL).

In his book, *Teaching ESL and STEM content through CALL*, Abdelilah Salim Sehlaoui reflects upon his over thirty years' experience in TESOL Teacher Education Programs. Based on the fact that there is, undoubtedly, a digital divide and starting from the conviction that technology is not neutral, the author thinks that the majority of teachers are all but well equipped to help learners of English acquire competence not only in language, but also in STEM. For example, whereas *Google Translate* covers many of the worlds' languages, there are more than 200 languages in the sub-Saharan African continent unavailable to the ethnic groups who populate it and hence they are left unable to enjoy the benefits of technology others take for granted.

Moreover, the author is aware that nowadays books do not meet the needs of the educational community regarding practical applications. Thus, with this book, he tries to help teachers by providing them with practical activities, examples, and classroom "vignettes" that exemplify how the different areas of STEM content can be taught using an interdisciplinary critical pedagogical approach. The book concludes with appendices, a reference list, an index, and biographical notes about the author.

All 7 chapters follow a common structure consisting of an overview followed by a series of questions about the target topic of the chapter which it then goes on to answer systematically. The third section of each chapter consists of one or several "vignettes" (or brief real-life examples), a summary, critical reflective inquiry tasks, and a daily CALL-based lesson plan.

The first chapter describes the theoretical foundations of the pedagogical and research-based approach used in the integration of CALL in teaching both language and STEM content to English language learners, and provides a definition of CALL and its historical development together with a brief socio-cultural analysis. Research-based criteria serve as a guide for the use of CALL in teaching STEM academic content and various language skills such as reading, writing, listening and speaking, as well as developing critical cross-cultural communicative competence (C5)¹.

In the second chapter, the author focuses on two central areas of language, vocabulary and grammar, and how educators can empower learners through readily available apps and web-based programs. Taking Atkinson's (1972) research as a reference, among others, he claims that CALL programs can be valuable for explicit vocabulary instruction and that, in addition, vocabulary acquisition favours successful language intake and STEM content intake. Nevertheless, the author reminds us that, as indicated by Oxford (1990),

¹ Critical cross-cultural communicative competence (C5) is made up of Critical Pedagogical Competence (CPC) and Critical Technological Competence (CTC) and is defined as the ability on the part of the educator to effectively transmit the new knowledge in an effective way to the student.

vocabulary learning and teaching is useless without the teaching and learning of vocabulary strategies.

Chapter 3 explains how CALL should be used to develop multiple literacies in STEM. In this chapter, the importance of critical reflection and metacognitive processing is stressed. Sehlaoui insists that students should be encouraged to create texts themselves in both their native language and their second language. He includes a short description of the discourse and the linguistic characteristics of STEM texts, some of the problems that language learners face in reading and writing, and how they can develop their literacies.

Chapter 4 outlines the importance of CALL design that utilizes a project-based approach which includes training in linguistic (syntax, morphology, and semantics), paralinguistic (intonation, stress, and rhythm patterns), and extra linguistic (body language, expressions, gestures) aspects of listening and speaking. The critical pedagogical approach and the use of multimedia material serve as facilitators. Through listening and speaking, learners construct knowledge and process information to enable them to communicate effectively through the four language skills. In this chapter the reader will learn how to go about writing instructional objectives in listening and speaking using CALL for learners to meet academic STEM content standards.

Chapter 5 presents a guide on the use of CALL to empower learners in bilingual and dual language education contexts. Sehlaoui asserts that a hegemonic approach in education will no doubt contribute to heritage language loss among English language learners as they start to detach from their linguistic and cultural heritage. His proposal here is well-grounded in research-based evidence which shows that instruction in the students' heritage language is beneficial for the learner's acquisition of English and success in academic content (Ramirez, Yuen, & Ramey, 1991; Collier, 1992; Rolstad, Mahoney, & Glass, 2005; Thomas & Collier, 2002). This is a very interesting chapter to read as it defines key concepts such as hidden curriculum, status differential, heritage language loss, language shift, service learning, self-esteem in STEM and heritage education. It aims at leading educators to help their students develop multiple literacies as they acquire communicative competence and literacy in English.

Chapter 6 deals with the area of culture teaching and learning via CALL from a critical perspective. Like the concepts of power, context and culture, the concept of cultural identity is another thread running throughout this book. When educators are faced with the cultural process of discrimination and stereotyping, they need to have a clear understanding of how this process works and how to deal with it in the classroom. According to Sehalaoui (1999) in order to educate teachers to become critical ethnographers, classroom activities in TESOL teacher education program should focus on how to carry out interview, observation, data analysis, peer exchange and review, and field note-taking activities. The author cites Hammmerley (1992, p. 99) to explain that "[...] becoming a critical ethnographer means to have an emancipator interest in overcoming social inequality and injustice [...]"

In chapter 7, Sehlaoui sets out the traits of a professional and explains what TESOL critical self-professional development (CPSD) is and how teachers can design, implement, and evaluate it. The author warns us that educators require certain qualities such as critical cross-cultural communicative competence (C5) that allows them to interact and communicate with others. They should, in his view, train themselves in how to document the impact of their teaching on students' learning. He also criticizes the "teaching to do the test" approach and claims that teachers need to have a solid theoretical background, critical reflective thinking, and action research skills. However, by quoting Schön (1983), he agrees that we must not forget that professional knowledge is grounded in professional experience.

Conclusion

This book has been written in a very direct, reader-friendly style, even though, at times it is repetitive. The language used is appropriate for the author's concise expression of his arguments.

Teachers will choose this book over others because it is easy to use and has helpful lesson plans, as well as a variety of analytically selected web sites and critical reflective inquiry tasks.

Language researchers, on the other hand, will appreciate the author's proposals, which are rigorously documented and always based on relevant research on fundamental topics in the fields of STEM and CALL.

Yet, what will probably best remain in our memory after reading this book is the clear allusion to hidden curricula. Sehaloui advocates a critical perspective and envisions a more multifaceted approach to understand students' development of the skills that promote STEM educational pathways and lifelong learning.

The author defends interdisciplinary learning, innovative and accessible assessment that allow teachers to offer immediate feedback to students, as well as the need to surmount historical and socio-cultural concepts of STEM that have formed society's representation of who is good at science or who belongs to the elite of STEM.

All in all, as Sehaloui himself (2018, p, 202) puts it, servicing others "involves a moral commitment". It is not about fostering "critical thinking skills for the sake of being critical, but in order to bring about change for a better world".

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