Standards-Based Technology Integration for Emergent Bilinguals

Briana Ronan

Introduction

Today's educators serve the United States public-school system at a time of considerable curricular, technological, and demographic change. In 2010, the Common Core State Standards in Math and English Language Arts significantly altered the curricular landscape of K-12 classrooms. On the heels of this reform came the adoptions of English Development/Proficiency Standards and Next Generation Science Standards.

These new standards are not only more academically rigorous, but they also call for teachers to prepare students for successful learning with 21st century tools. Increased expectations for technology integration have resulted in school districts seeking ways to improve their Internet infrastructure and provide 1:1 computing devices for all students.

Such standards reform and technology demands have also come at a time of significant demographic change in the U.S., particularly in states like California, where emergent bilingual students comprise over 22% of the K-12 public school population and represent over 60 language groups (California Department of Education, 2015b). Teachers of emergent bilinguals are often faced with unique changes to support their students in meeting the new content and English language standards while also gaining equitable access to technology.

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This article aims to address this challenge by presenting a standards-based framework for supporting technology integration with emergent bilingual students. The framework adapts a leading model for technology integration, the Technological, Pedagogical, and Content Knowledge (TPACK) model, and aligns it with English Language Development (ELD) and International Society for Technology in Education (ISTE) standards. The article also discusses exemplar activities, technologies, and essential planning questions to aid teachers in designing technology-integrated lessons for a multicultural, multilingual student population.

Theoretical Framework: TPACK Model

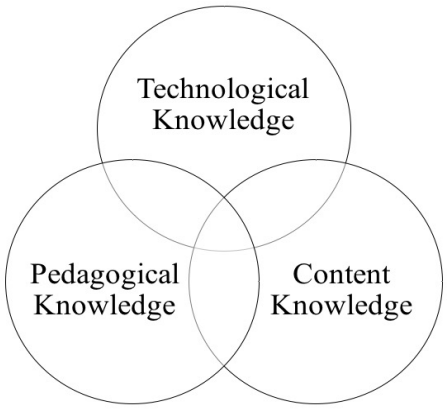
In developing a framework for technology integration for emergent bilinguals, it helps to examine existing frameworks and models. The leading model in the field of education is the TPACK framework. Mishra and Koehler (2006) developed the this framework in an effort to address a significant oversight in technology integration. They noted that all too often teacher training and professional development tend to emphasize the technical functions of technology.

For example, how does a device turn on/off, create student accounts, access reporting options, or connect to peripheral devices? This emphasis on technological knowledge is prioritized to the exclusion of how the technology can be used in concert with content knowledge and pedagogical knowledge. Thus, TPACK was proposed as an effort to apply a much-needed theoretical basis for understanding what constitutes effective technology integration (Mishra & Koehler, 2006).

The TPACK framework builds on the work of Shulman (1986), who sought to integrate two previously separate and discrete bodies of knowledge—content knowledge and pedagogical knowledge. Shulman was concerned with how content can be best organized, adapted, and represented to learners through pedagogical techniques and strategies.

The result of this intersection was Pedagogical Content Knowledge (PCK). Shulman (1986) conceptualizes PCK as including "the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations—in a

Figure 1
TPACK Model (Mishra & Koehler, 2006)



word the ways of representing and formulating the subject that make it comprehensible to others" (p. 9). When teachers develop a sophisticated understanding of PCK, they are better prepared to anticipate and address their students' struggles and misconceptions.

When teachers can do all of this with the aid of technology, then they add another unified body of knowledge to their toolbox: TPACK. This body of knowledge lies at the intersection of technological knowledge, content knowledge, and pedagogical knowledge (See Figure 1). The TPACK model is not about learning the newest and most popular digital tool, but rather how teachers can use such digital tools to represent content in new ways, enhance particular instructional approaches or strategies, and build on existing knowledge in order to improve or enhance understanding of content and pedagogy.

For teachers of emergent bilinguals, TPACK includes developing a deep understanding of English Language Development as a content area (content knowledge), various pedagogical techniques to support teaching ELD (pedagogical knowledge), and effective use of technology and digital tools to facilitate students' language development (technological knowledge). One aim of this article is to discuss what counts as TPACK for English Language Development, specifically how is it is defined within California's English Language Arts/English Language Development Framework (California Department of Education, 2015a).

Pedagogical Language Knowledge

Unlike other content areas, such as math, science, social studies, or even English Language Arts, English Language Development is not a subject area that all students receive in schools. Rather, it is reserved for emergent bilinguals, students who learn English as an additional or new language. The California Department of Education considers ELD to be a "specialized instructional support" that fosters academic English development and full access to the other core subjects (California Department of Education, 2015a, p.10). Given its unique position and purpose in the curriculum, ELD requires a PCK that is quite distinct from other disciplines.

Traditionally, educational linguists have considered knowledge of second language acquisition theories and linguistic features and structures of English, such as syntax, semantics, and phonology to be essential in teaching ELD (Freeman & Freeman, 2004). However, more recent reviews of PCK for ELD/ESL educators have noted that such decontextualized, linguistic knowledge bases are often insufficient in supporting students' access to the core academic curriculum (Galguera, 2011; Bunch, 2013).

Instead, a newer perspective argues for the development of *Pedagogical Language Knowledge* (PLK) which is defined as the "knowledge of language directly related to disciplinary teaching and learning and situated in the particular (and multiple) contexts in which teaching and learning take place" (Bunch, 2013, p. 307). PLK distinguishes itself from PCK in that it emphasizes the integration of language with content area teaching and learning.

A PLK vision of ELD instruction includes teaching students to identify and analyze key linguistic features and structures of disciplinary texts, such as comparative clauses in math problems or the passive voice in social studies and science informational texts. This same emphasis on language is a hallmark of the Common Core State Standards in Math and ELA.

These newer standards are considerably more language and literacy-focused than previous standards, requiring students to engage in purposeful meaning-making with a variety of complex text individually and in collaboration with others (Bunch, 2013; California Department of Education, 2015a).

When California revised its English Language Development Standards in 2012, it did so in an effort to align with and support the language demands of the Common Core State Standards. The revision resulted in several significant shifts in its definition of PLK. Rather than seeing language development as a set of grammatical rules to be mastered by an individual learner, the new framework situates language as a resource for interactive, meaning-making in a social context (California Department of Education, 2015a).

Prior to these new standards, ELD was often taught in isolation from the core content with standards organized by reading, writing, listening, and speaking skills. In the new framework, ELD instruction draws to and from the content area and the standards are organized by communicative modes and linguistic processes.

The California ELD standards are organized in two main parts (See Appendix A). Part I of the ELD standards, "Interacting in Meaningful Ways," focuses on the communicative functions of English. It consists of three main communicative modes: Collaborative, Interpretive, and Productive. The second part of the ELD standards, "Learning How English Works," focuses on linguistic forms and structures of the English Language. Part II of the standards consists of three main linguistic processes: Structuring Cohesive Texts, Expanding and Enriching Ideas, and Connecting and Condensing Ideas. The ELD standards are designed to be used with emergent bilingual students in all content areas and across all grade levels.

Standards that Support Technology Integration

As previously noted, California's ELA/ELD framework is a document that provides the rationale for the creation of the state's new ELD standards. One justification that stands out in the framework is the need to prepare students for "living and learning in the 21st century" (California Department of Education, 2015a, p. 5). The ELA/ELD framework references the Common Core English Language Arts Standards in its definition what it means to be technologically literate:

> Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn through technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals. (National Governors Association, 2010, p.7)

Despite this emphasis on the use of technology in the body of the ELA/ELD framework, very little carries over to the actual language of the standards. Only two ELD standards make explicit reference to technology: (1) *PI.A.2: Interacting with others in written English in various communicative forms (print, communicative technology, and multimedia)* and (2) *PI.C.10: Composing/writing literary and informational texts to present, describe, and explain ideas and information, using appropriate technology* (California Department of Education, 2012).

Given the limited mention of technology in the body of the ELD standards, teachers may need to turn to another set of standards to guide their technology integration. The ISTE standards are the leading set of standards for technology integration in education. They were created by the

International Society for Technology in Education and were recently revised in 2016 (International Society for Technology in Education, 2016).

The ISTE standards reflect a TPACK sensibility as they not only focus on the acquisition of technology-specific skills (technological knowledge) but also include the effective use of technology to represent content knowledge (technological content knowledge) and the use of technology to aid instruction and learning (technological pedagogical knowledge). The ISTE standards for students include seven overarching standards that span all grade levels (See Appendix B). Like the ELD standards, the ISTE standards are meant to cross disciplinary boundaries.

For teachers of emergent bilinguals, there are a couple ISTE standards that stand out as particularly relevant. The first is the "Creative Communicator" standard, which focuses on use of different platforms, tools, and digital media for individual expression. The language of this standard not only aligns well with ELD standards *PI.A.2* and *PI.C.10*, but also allows for potential use of students' home languages and dialects as a resource for meaning-making in digital communication.

Another standard that reveals its importance in ELD is the "Global Collaborator" standard, which emphasizes the use of digital tools to communicate with local and global audiences. This directly relates to many emergent bilingual students' daily out-of-school practices using digital tools to communicate with extended family members in their home countries.

While all seven ISTE standards can be effectively used to support English Language Development, these two standards provide an additional opportunity to build on emergent bilingual students' unique funds of knowledge and multilingual practices.

Planning Technology Integration for Emergent Bilinguals

The TPACK model, the ISTE standards, and the ELA/ELD standards can be useful guideposts for identifying teaching and learning goals, but none prescribes a specific approach to planning lessons. In their literature review on the TPACK framework, Chai, Koh, and Tsai (2013) note that no consensus exists on how to plan technology integrated instruction.

One study by Harris et al. (2010) suggests identifying activities for specific learning topics first and then exploring specific technology that can support these activities, while a different study by Polly, Mims, Shepherd, and Inan (2010) starts out by focusing on technological knowledge and developing tech skills.

Since most TPACK studies have resulted in positive outcomes, Chai et al. (2013) suggest the sequence of steps may actually depend on the particular learning context. What seems more important, the authors argue, is the accounting of three presuppositions: (1) the kind(s) of available technology in the learning context, (2) learner needs and prior knowledge, and (3) the teacher's pedagogical approach and instructional decision-making.

To these three presuppositions, we can add an additional layer of instructional planning provided by Rymes, Flores, and Pomerantz (2016). These authors present a three-part cycle for thoughtful, standards-based instruction of emergent bilingual students. This cycle is particularly effective in building on students' home languages and prior experiences with technology. The first stage requires *discovering* students' linguistic repertoire, including use of multiple languages and technology and digital tools. The second stage of the cycle involves *designing* lessons that draw on or enhance these repertoires, and the third stage involves teachers and students *doing* the lessons and enacting their repertoires in order to expand communicative possibilities.

The following section draws on this three-part approach to suggest possibilities for integrating technology with multilingual learners. These possibilities are organized according to the three communicative modes from California's ELD standards: Productive, Interpretive, and Communicative. Each mode is presented with possible activities, relevant ELD and ISTE standards, guiding TPACK questions, and examples of supporting digital tools and technology. Tables 1-3 include details on these activities and links to various websites and apps.

Productive Possibilities

Emergent bilingual students stand to benefit significantly from activities that enhance their productive speaking, writing, and technology skills. These skills are essential for demonstrating new or enhanced understanding of a topic. One activity that can be used across content areas is the publication of literary texts and informational reports in the form of multilingual e-books.

Table 1
Productive Possibilities

Activity	*Standards*	*TPACK*	*Supporting Technology*
Research & author multilingual e-books or reports	ELD Standards: PI.C.10; PI.C.12; PII.A.2 ISTE Standards: 3. Knowledge Constructor 6. Creative Communicator	What digital tools can support students in drafting and publishing their written work?	StoryKit and StoryCreator apps available in app stores Storybird: https://storybird.com
Produce animated videos and avatars	ELD Standards: PI.C.9; PI.C.10; PII. B.5. ISTE Standards: 3. Knowledge Constructor 6. Creative Communicator	How can videos and avatars help students gain confidence and practice with English speaking skills?	PowToon: https://www.powtoon.com Voki: http://www.voki.com
Design and share infographics via social media	ELD Standards: PI.C.10; PI.C.11 ISTE Standards: 2. Digital Citizen; 5. Computational Thinker; 6. Creative Communicator	What technological skills and knowledge about social media will students need in order to effectively produce and distribute digital artifacts?	Canva for Infographics: https://www.canva.com/ Various social media platforms: Twitter, Instagram, Snapchat and Facebook

Authoring multilingual texts not only supports emergent bilingual students' home language but also helps development sophisticated metalinguistic and cross-linguistic skills (Cummins, 2005). Students can work together in heterogeneous or homogeneous language groups to research, draft, and publish their books, using e-book apps and websites.

A similar approach can be used in drafting scripts and dialogues for animated videos. The use of animated avatars may provide shy or reluctant speakers a safe environment to practice and take risks with their speaking skills.

Social media platforms, like Twitter, Facebook, or Instagram, already form a part of many emergent bilingual youths' daily communicative repertoires. These platforms can be effective spaces to disseminate student work to parents, friends, and community members. Students involved in research projects can also disseminate their findings in the form of infographics or other digital artifacts.

Interpretive Possibilities

Activities that enhance students' interpretive possibilities are those that support reading and listening comprehension. The use of multimodal images and videos can be particularly useful supports for who have limited prior knowledge about a topic or who are challenged by dense academic texts (Ronan, 2017).

Photographs and videos of everyday objects, events, or situations can be found using a simple search in an Internet browser, but more specialized searches may require the use of historical archives. The U.S. Library of Congress Digital Collections and the Smithsonian Learning Lab websites are excellent resources for educators and students as they provide free access to millions of primary and secondary source documents, historical records, and photographs.

Other activities that can support students' interpretation of texts are the use of translation tools and translanguaging activities. While online translation services like Google Translate are not error-free, they may provide draft translations which can be further improved through student edits and collaborations.

The Google Translation app allows teachers and students alike to upload photos and pdfs for translation as well as receive real-time voice-to-text translations. Translation tools can be particularly useful when students are given the opportunity to translanguage, or alternate between their home languages and English, while engaging in their academic work.

Finally, another useful way to support students' interpretive skills is to engage in

Table 2
Interpretive Possibilities

Activity	*Standards*	*TPACK*	*Supporting Technology*
Use images/videos to support content knowledge	ELD Standards: PI.B.5, PI.B.6 ISTE Standards: 3. Knowledge Constructor	How can visuals and videos aid student comprehension of written or spoken English?	U.S. Library of Congress Digital Collections:https://www.loc.gov/collections/ Smithsonian Learning Lab: https://learninglab.si.edu/ YouTube and Google Images
Translation & translanguaging	ELD Standards: PI.B.7; PI.B.8 ISTE Standards: 6. Creative Communicator; 7. Global Collaborator	How can students' home languages be used as a support in understanding content in English?	Google Translate and other text-to-speech apps
Analysis of language use in social media	ELD Standards: PI.B.6; PI.B.7 ISTE Standards: 6. Creative Communicator	How can social media platforms influence language use?	Various social media platforms: Twitter, Instagram, and Facebook

Table 3
Collaborative Possibilities

Activity	*Standards*	*TPACK*	*Supporting Technology*
Co-design and co-author digital documents and presentations	ELD Standards: PI.A.3: PI.C.9: PI.C.10 ISTE Standards: 3. Knowledge Constructor; 7. Global Collaborator	How can co-authoring documents and presentations support students' development of oral and written English?	Google Docs and Google Slides
Interview community or family members from various cultural and linguistic backgrounds	ELD Standards: PI.A.1; PI.B.5 ISTE Standards: 6. Creative Communicator; 7. Global Collaborator	What technological, communication, and cross-cultural skills do students need to develop to conduct interviews?	Digital audio recording apps and smartphone cameras Video-conference tools: Skype, Facetime, and Google Hangouts
Communicate and collaborate with classrooms and individuals around the world	ELD Standards: P1. A.1; PI.A.4 ISTE Standards: 6. Creative Communicator; 7. Global Collaborator	How can technology be used to connect students to a global audience?	iEARN for Global Projects: https://iearn.org/ Video-conference Tools: Skype, Facetime, and Google Hangouts

analysis of how language is used differently across various social media platforms. While many students are already skilled consumers of social media, they may be less aware of how language is used in these platforms. Working in groups, students can compare how online content writers use social media platforms to convey their message and the affordances and constraints of that each platform. Such an activity fosters language analysis skills as well as knowledge about social media norms and internet etiquette.

Collaborative Possibilities

Collaboration is a key feature of California's ELA/ELD framework. No longer are emergent bilingual students expected to practice language skills individually or in isolation, but rather they are expected to work closely with peers of all language backgrounds and proficiency levels. Students work in pairs or in teams to co-design and co-author reports, documents, and presentations.

Document sharing tools, like Google Docs and Google Slides, can be particularly useful as all team-members can work on the project simultaneously even if they are not all in the same classroom. Embedded chat and comment functions allow students to send each other questions or clarifications.

To gain experience collaborating with others beyond their classroom peers, students can conduct group interviews with family members or influential community members. Given that many emergent bilingual students come from multilingual communities and families, this activity helps facilitate development of cross-cultural communication and supports bilingual listening and speaking skills. These interviews can be conducted in person using video or audio-recorders or via video-conferencing platforms.

Similar tools can also be used to communicate and collaborate with larger audiences, including classrooms in other countries. There are a number of organizations, like iLEARN, that match classrooms from around the world to work on common projects. Alternatively, colleagues at different schools in the same state or school district can set-up similar class-to-class relationships using video-conferencing platforms.

When designing collaborative activities for students, it is important for teachers to keep in mind the technological knowledge and language skills of each member, so that all students have an opportunity to contribute to the work of the group.

Conclusion

When educators plan ways to integrate technology into their instruction for emergent bilingual students, it is essential that they keep in mind the unique characteristics and needs of the students and their classroom context. The activities and technologies discussed in this article are merely presented as starting points for consideration. In evaluating whether a particular activity or technological tool will benefit their students, a teacher might consider the following questions:

> What are my learning goals for my classroom community?
>
> How do these goals/tools relate to content knowledge standards, ISTE standards, and ELD standards?

Then one might ask:

> What are my students' prior knowledge and experience with this particular content/tool?
>
> How can it build on their linguistic repertoires?

Finally, one might consider the available technology in the classroom.

> To what extent does available technology build and expand on my students' knowledge and help achieve my learning goals?

If the technology doesn't provide a meaningful difference in how the content is represented or the nature of the work that students engage in, then one might consider if technology is really necessary or if other forms of technology are needed.

However, when considered thoughtfully and carefully, technology integration can provide rewarding and motivating experiences for teacher and students alike. For emergent bilingual students in particular, technology integration can be a valuable vehicle for fostering creativity, self-expression, and academic achievement.

References

Bunch, G. C. (2013). Pedagogical language knowledge: Preparing mainstream teachers for English learners in the new standards era. *Review of Research in Education, 37*(1), 298-341.

California Department of Education. (2015a). *English language arts/English language development framework for California public schools*. Sacramento, CA: Author.

California Department of Education. (2015b). *Facts about English learners in California*. Retrieved from http://www.cde.ca.gov/ds/sd/cb/cefelfacts.asp

California Department of Education. (2012). *California English language development standards: Kindergarten through grade 12*. Sacramento, CA: Author.

Cummins, J. (2005). A proposal for action: Strategies for recognizing heritage language competence as a learning resource within the mainstream classroom. *Modern Language Journal*, 585-592.

Freeman, D. E., & Freeman, Y. S. (2004). *Essential Linguistics: What you need to know to teach reading, ESL, spelling, phonics, and grammar*. Portsmouth, NH: Heinemann.

Galguera, T. (2011). Participant structures as professional learning tasks and the development of pedagogical language knowledge among preservice teachers. *Teacher Education Quarterly, 38*(1), 85-106.

Harris, J., Hofer, M., Blanchard, M., Grandgenett, N., Schmidt, D., van Olphen, M., & Young, C. (2010). "Grounded" technology integration: Instructional planning using curriculum-based activity type taxonomies. *Journal of Technology and Teacher Education, 18*(4), 573-605

International Society for Technology in Education. (2016). *ISTE standards for students*. Retrieved from https://www.iste.org/standards/standards/for-students

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017.

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common core state standards for English language arts and literacy in history/social studies, science, and technical subjects*. Washington DC: Authors.

Polly, D., Mims, C., Shepherd, C. E., & Inan, F. (2010). Evidence of impact: Transforming teacher education with preparing tomorrow's teachers to teach with technology (PT3) grants. *Teaching and Teacher Education: An International Journal of Research and Studies, 26*(4), 863-870.

Ronan, B. (2017). Digital tools for supporting English language learners' content area writing. In M. Carrier, R. M. Damerow, and K. M. Bailey (Eds.), *Digital language learning and teaching* (93-103). New York, NY: Routledge.

Rymes, B., Flores, N., & Pomerantz, A. (2016). The common core state standards and English learners: Finding the silver lining. *Language, 92*(4), e257-e273.

Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Appendix A

California English Language Development Standards

(California Department of Education, 2012)

Part I: Interacting in Meaningful Ways

A. Collaborative
1. Exchanging information and ideas via oral communication and conversations
2. Interacting via written English (print and multimedia)
3. Offering opinions and negotiating with or persuading others
4. Adapting language choices to various contexts

B. Interpretive
5. Listening actively and asking or answering questions
6. Reading closely and explaining interpretations and ideas from reading
7. Evaluating how well writers and speakers use language to present ideas
8. Analyzing how writers use vocabulary and other language resources

C. Productive
9. Expressing information and ideas in oral presentations
10. Writing literary and informational texts
11. Supporting opinions or justifying arguments and evaluating those of others
12. Selecting and applying varied, precise vocabulary and other language resources

Part II: Learning About How English Works

A. Structuring Cohesive Texts
1. Understanding text structure and organization
2. Understanding cohesion

B. Expanding and Enriching Ideas
3. Using verbs and verb phrases
4. Using nouns and noun phrases
5. Modifying to add details

C. Connecting and Condensing Ideas
6. Connecting ideas within sentences by combining clauses
7. Condensing ideas within sentences using a variety of language resources

Appendix B

ISTE Standards for Students

(International Society for Technology in Education, 2016)

1. **Empowered Learner**: Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.

2. **Digital Citizen**: Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.

3. **Knowledge Constructor**: Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.

4. **Innovative Designer**: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.

5. **Computational Thinker**: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

6. **Creative Communicator**: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.

7. **Global Collaborator**: Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.