



Bridgewater State University

Virtual Commons - Bridgewater State University

Honors Program Theses and Projects

Undergraduate Honors Program

5-16-2022

Bridging the Gap Between Language and Content: Teachers' Views on Technology

Emma Rohan
Bridgewater State University

Follow this and additional works at: https://vc.bridgew.edu/honors_proj

Recommended Citation

Rohan, Emma. (2022). Bridging the Gap Between Language and Content: Teachers' Views on Technology. In *BSU Honors Program Theses and Projects*. Item 590. Available at: https://vc.bridgew.edu/honors_proj/590

Copyright © 2022 Emma Rohan

This item is available as part of Virtual Commons, the open-access institutional repository of Bridgewater State University, Bridgewater, Massachusetts.

Bridging the Gap Between Language and Content: Teachers' Views on Technology

Emma Rohan

Submitted in Partial Completion of the Requirements for
Commonwealth Honors in Elementary Education

Bridgewater State University

May 16, 2022

Dr. Jeanne Carey Ingle, Thesis Advisor

Date: August 24, 2022

Dr. Herbert C. Hamilton Jr., Committee Member

Date: May 17, 2022

Dr. Gia A. Renaud, Committee Member

Date: May 21, 2022

Abstract

According to the Department of Elementary and Secondary Education, roughly twenty-five percent of English learners (ELs) in Massachusetts are not graduating high school (DESE, 2021). This alarming rate of students whose first language is not English dropping out of school stems from an inequitable access to education for ELs that needs immediate attention. Research shows the use of technology in the classroom is one way in which educators can work to actively engage ELs in their educational experience and provide them with greater opportunities and access to both language and content knowledge (Brown & Allmond, 2021; Chambers, 2021). The goal of this study is to see what technology works in inclusion classrooms to provide them with more equitable access to educational content. This qualitative study includes interviews with teachers and observations in inclusion classrooms.

Introduction

According to 2018 statistics published by the Pew Research Center, five million students, roughly 9.5% of public school students enrolled in the United States are English learners (ELs), which is a significant increase from the 2000 estimate of 8.1% of students being ELs (Bialik, Scheller, & Walker, 2018). Over two-thirds, 67%, of the ELs enrolled in public schools in the United States are elementary aged-students, enrolled in grades K-5. Research suggests that Spanish is the most common first language spoken by ELs with 77% of the students speaking it at home, however, ELs speak 400 different languages at home (Bialik, Scheller, & Walker, 2018).

Despite the increasing number of EL students in United States' public schools, far too many of them still fall victim to an education system that was not designed for them. According to the Department of Elementary and Secondary Education, roughly twenty-five percent of ELs in Massachusetts are not graduating high school (DESE, 2021). ELs face so many challenges in the school setting that it is leading to these dropout rates that are astronomically high. For example, according to an article published by Rodriguez, et al. (2019), ELs face issues in four primary areas that translate into higher dropout rates: inadequate school services, academic, family and socioeconomic, and instructional challenges. More specifically, the data suggests that of the study participants, 57% reported a lack of resources available to students that may have fallen behind, which may be connected to the fact 52% reported that their schools lacked adequate funding. Additionally, 68% of participants state that a major struggle for ELs is the fact that they deal with home issues, which 62% of participants connect directly to the students' need to prioritize working rather than going to school (Rordriguez, et al., 2019). These are major

problems that need immediate action. School systems need to do a better job getting ELs engaged in their education at a young age.

Technology is well documented as an excellent engagement tool (Chen, et al., 2013; Lee, et al., 2020) and using technology to support the learning needs of ELs makes sense. Especially at the elementary level, technology can be integrated into a wide variety of lessons to spark student interest and attention. It can be used to encourage students to take more of an active role in their education, rather than taking a passive one. Not only that, but students are more likely to actively engage in material if it is presented in a dynamic way, which is exactly what technology has the ability to do, making it an asset in the classroom.

This research explores what kinds of technology teachers are using in inclusion classrooms with both ELs and heritage English speakers. To investigate which kinds of technology were the most effective at providing ELs more equitable access to educational content, researchers conducted naturalistic observations in inclusion classrooms and spoke to the classroom teachers in semi-structured interviews. By documenting what kind of technology is actually working effectively for teachers in classrooms, we can begin to cultivate the mindset that speaking another language is an asset and remind educators that a language barrier is not a disability. This study will have great benefit to future and current educators as it will provide more insight into the ways in which teachers can provide ELs with greater access to content. While there is existing literature advocating for further integration of technology into the classroom to benefit ELs, this study will add to the conversation by providing real-world examples as to what kinds of technology work and why this technology should be a priority throughout our school systems.

Literature Review

Speech-to-Text

One of the major themes present amongst the literature surrounding the benefits of technology use for ELs is that software such as text-to-speech, speech-to-text, dictation, and word prediction seem to be the most successful and offer the greatest benefits. For example, there is one research study investigating speech-to-text (STT) technology and whether it could be used to help ELs was conducted by Arcon, et al. (2017). One of the biggest struggles for ELs in elementary school is that their lack of extensive English vocabulary negatively impacts the quality of their writing. The study found that dictation could be used in an elementary school classroom to help ELs that struggle with their handwriting. This accommodation has the potential to lead to longer and more developed written pieces. Additionally, speech-to-text software was proven to be useful for ELs and, similarly to dictation, could help these students develop written works of a higher quality. However, it is important to note that some speech-to-text software is highly sensitive and will not be as accurate for ELs that have a strong accent.

Additionally, another study was conducted by Shadiev et al. (2015) in which researchers looked at the benefits of Speech-to-Text Recognition (STTR) during in-person lectures for non-native English speakers. The experimenters provided written transcripts to participants in these face-to-face lectures that did not speak English as their first language, and the results supported the initial hypothesis that these transcripts would benefit students. In fact, the results showed that the transcripts helped due to the fact they significantly reduced the amount of information that had to be stored in working memory immediately because there was a hard copy of the information. Not only that, but these transcripts allowed students to translate more of the information from the lecture into their long-term memory because they had a written hard copy

of the information and were not solely relying on what they heard. Participants used the transcripts in various ways – some used them in their entirety for studying purposes, while others were able to summarize them and apply the information to their own personal ideas.

Furthermore, research done by Brown and Allmond (2021) focuses on word prediction software as a form of assistive technology that is beneficial to younger students. Word prediction software is available on most technological devices and is an inexpensive tool to enhance the ways in which ELs write in English. The program provides a list of word suggestions based on letters that the students type, as well as the context of everything else that they have already written. One of the major benefits of word prediction software is that it helps eliminate spelling issues, while also teaching students the correct spelling of particular words, due to the fact spelling can be a major challenger for young ELs. The research suggests that the primary issue with spelling is that, when students want to write a word that they don't know how to spell, they will often give up and stop writing altogether due to frustration. Word prediction software can help minimize this problem by providing them the correct spelling so that they keep writing and, eventually, they are able to spell the word without scaffolding.

Finally, Chambers' (2021) research article explores technological advances in text-to-speech software and its place in the classroom. He argues that one of the biggest attributes of text-to-speech technology is its accessibility. In today's technologically advanced world, most smart devices, such as phones and tablets, as well as laptops and computers found in schools, come already equipped with text-to-speech software. This negates any need to purchase additional software for a student, therefore, eliminating the inability to utilize this form of assistive technology. With specific regard to ELs, text-to-speech technology offers students another way to hear the correct pronunciation of words they are learning. It offers them the

ability to repeat text so that it can be read aloud to them in an attempt to master the sounds of words within the English language. Chambers drives home the idea that this readily available technology can and should be used in the classroom to help, not just ELs, but also students that need a wide range of classroom accommodations for a plethora of reasons.

Student Success

In addition to which kinds of technology appear to be most effective for EL students, the literature also highlights the idea that access to technology is a key component of student success. Liu, Navarrete, and Wivagg (2014) researched the ways in which an iPod touch can be used to help ELs academically. According to these researchers, one of the ways to help ELs thrive in an English monolingual classroom is to ensure they have access to assistive technology inside of the classroom. Students were given iPods to use during their classes that were loaded with learning games, books, audiobooks, and other multimedia resources that their teachers had control over. The point of giving ELs this technology was to help create individual learning plans for the students, as well as giving them access to educational technology at home. The use of iPod touches as an educational tool allowed ELs the opportunity to practice their literacy and language skills in multiple different ways and in various settings, both at school and in the comfort of their own homes.

In addition, the experimental research study performed by Sandberg, Maris, and de Geus (2011) examined the impact, if any, that mobile technology had on fifth grade students learning English as a second language. In an attempt to test this theory, researchers developed three conditions to which students were randomly assigned. The first condition served as the control for the experiment. Meanwhile, the second had access to a mobile application that they could use to help them learn their targeted English words, however they handed their phones in when the

trip to the zoo ended. Finally, the third condition also allowed students to use the same mobile application at the zoo, however, they got to keep the mobile phone with them for two weeks. All students were given a pretest and a posttest which focused on their targeted English vocabulary as the dependent variable, making the learning method the independent variable for the experiment. Results indicated that students from the third condition scored higher than those in the other two conditions on the vocabulary posttest. The application served as a tool to motivate students to use it, therefore, practicing their English. Overall, the results of the study lend well to the idea that technology, such as mobile applications, would be effective within a classroom setting to enhance ELs' achievement.

It is also important to note the fact that previous research has also noted the increased use of technology in STEM classes as a way to allow ELs greater access to content knowledge. Researchers Terrazas-Arellanes et al. (2018) took an interest in the inequities for ELs within STEM classrooms. These marginalized students have historically performed poorer on standardized science assessments than Caucasian students who speak English fluently as their first language. Oftentimes, ELs lack the English proficiency and vocabulary base to grasp fundamental science concepts when they are delivered in English. With that in mind, these researchers discovered that the use of multimedia online learning resources, as opposed to constant lecture material, helped students learning English build a foundation in their science courses. These online activities are helpful when trying to engage learners and they help to improve literacy skills in an interactive way. This multimedia technology is important to implement in classes, specifically STEM classes such as science, because it serves as a great educational resource that improves literacy and expands the vocabulary of ELs.

Teachers and Technology

Finally, there is evidence in previous research that suggests the importance of teachers' familiarity with technology on its efficacy for improving achievement levels of ELs. Darling-Aduana and Heinrich (2018) designed a study intended to look at the impact that use of educational technology, as well as the degree to which it is used, has on the achievement levels of ELs. This particular study looked at ELs in both English-only classrooms and those in English/Spanish bilingual classrooms. Researchers questioned whether, in addition to technology use, teacher expertise regarding that technology impacted student outcomes. After careful analysis of the results, these researchers discovered that the time lost in the classroom due to technical issues that teachers were unable to solve was negatively associated with student learning. However, results also suggested that educational technology has the potential to increase student achievement outcomes for ELs depending on the extent of which it is used. However, to maximize the potential benefit of these technical tools, teachers need to be properly trained on how to use them effectively and resolve any inevitable technical difficulties.

Methods

Participants

The demographic of participants within this study is made up of public school teachers in Massachusetts. These teachers work at the elementary level, K-6, and work with ELs. There were a total of six participants in this sample, all of which were female educators, that were recruited via email by the researchers. The researchers identified school districts in Massachusetts with high populations of EL students and reached out to them through either the superintendent or the district's EL coordinator. These districts then connected researchers with the teachers that agreed to be observed and/or interviewed. Out of the six total participants, all of them agreed to observation, and five of them also agreed to be interviewed.

Pseudonym:	Grade:	Number of ELs in Classroom:	Observed:	Interviewed:
Mrs. Red	3rd	1 EL	Yes	Yes
Mrs. Blue	K	1 EL	Yes	Yes
Mrs. Green	2nd	3 ELs	Yes	Yes
Mrs. Pink	1st	8 ELs	Yes	No
Mrs. Yellow	1st	7 ELs	Yes	Yes
Mrs. Orange	1st	16 ELs	Yes	Yes

Materials

The following materials were used as observation and interview protocols throughout the duration of the study:

Observation Framework:

Teacher's Name:	Observer's Name:	Date and time:	Subject:
What is the teacher doing?			
What are the EL students doing?			
Questions:		Next Steps:	

Adapted from "Sample Lesson Plan for Observation (Perpendicular and Angle Bisectors)."

Teachers Pay Teachers

Semi-Structured Interview Protocol

1. Can you describe the population of your classroom with regard to how many students are English learners and how many are non-English learners?
2. What kinds of technology do you use in your classroom on a consistent basis?
 - a. Is said technology geared specifically towards English learners?
3. Which forms of technology do you find to be the most effective when delivering content to English learners?
 - a. Why do you feel as though it works well for English learners?
 - b. Could this technology be adapted/modified to be considered more effective? If so, how?
4. Which forms of technology have you used in the past and do not consider effective when delivering content to English learners?
 - a. Why do you feel as though this technology does not work well for English learners?
 - b. Could this technology be adapted/modified to be considered more effective? If so, how?
5. Is there any technology that you wish you had access to in your classroom? Why?
6. What technology would you most readily recommend inclusion classroom teachers use consistently?

Procedure

This research began with a review of existing literature surrounding the different forms of technology that can be used in the classroom to provide ELs with greater access to educational

content material. The researchers then identified major themes within the literature to form a foundational understanding of the experience of ELs, as well as to be used as a predictor for expected teacher responses. From there, researchers reached out to district administrators to recruit teachers to participate in this study. Through the recruitment process, researchers were able to set up dates and time to observe six different inclusion classrooms, as well as interview five of the six teachers regarding their technology use. The study was conducted through a combination of naturalistic observations and semi-structured interviews.

During the observations, the researchers did not interact with the students directly, but watched and listened to the teachers deliver content through lesson plans. They paid specific attention to the ways that technology was integrated into whole class work, small group work, and individual work. The researchers utilized their observation framework to take field notes on what the teachers were doing, what the ELs were doing, any questions that they had, and the next steps. Special attention was given to the ways that EL students utilized the technology that was modeled by the teachers, as well as what seemed to work the most seamlessly and effectively for the majority of students.

From there, the researchers conducted interviews with five of the six inclusion classroom teachers that they observed. Three of the semi-structured interviews were conducted virtually, while the other two were conducted in-person. All five interviews were considered semi-structured because the researchers followed the specific interview protocol that was developed but would ask pertinent follow-up questions that may have deviated from the predetermined questions. The purpose of these interviews was to hear directly from the teachers what kinds of technology they used in the classroom on a consistent basis. Furthermore, the interviews were intended to provide the researchers with a great understanding of what technology was effective

with ELs, what technology was not effective with ELs, and, perhaps most importantly, why certain technologies did or did not work.

Finally, the researchers conducted a thematic analysis of the data collected from both the observations through field notes and the teacher responses during the interviews. Similarly, there were themes pulled from the data that researchers collected. These themes were then compared with those originally identified in existing research and significant patterns emerged.

Results

The chart below reflects the different kinds of technology that teachers discussed in their interviews, as well as what they specifically had to say about them. The figure displays both the technology that teachers did find to be effective when working with ELs, as well as what they did not find effective when working with ELs. It breaks down each of the forms of technology that teachers mentioned throughout their interviews and then provides insight into why, or why not, they are used in the classroom. It highlights the actual views of teachers regarding technology in the classroom by providing direct quotes from their interviews.

Technology:	Teachers' Views:
Seesaw	<p>“Seesaw allows students to access material in different ways, as well as show their response in different ways students can draw, they can take pictures of their work, they can add videos, they can sort of like, adapt it to what they need. So for instance, this year, I have an English learner who is also nonverbal, but she will talk at home so I can put an assignment in that says read these words, and she can videotape herself doing it, and then I get to hear her voice because she's comfortable speaking at home.” - Mrs. Yellow</p>
Lexia Core 5	<p>“Their initial assessment, the directions are given in the native language, it can be set up like that. So even though the exercises and the development are in English, they at least know what they're supposed to be doing.” - Mrs. Orange</p>
STMATH	<p>“Our district-wide math program is STMATH, where the language is not involved at all. So it is fabulous for learners of English. Yeah, it's fabulous for everybody, but especially English language learners, because it takes all that language out of it. So they are really just manipulating and problem solving.” - Mrs. Yellow</p>
BrainPOP Jr. ELL	<p>“BrainPOP Jr. for ELLs is great because it is dense with language and vocabulary. Honestly, its language rich features are a major benefit to all students.” - Mrs. Green</p>
Unite for Literacy	<p>“Unite for Literacy translates stories into many languages. The students can go back and forth between English and another language. Many languages are available to choose from.” - Mrs. Blue</p>

Freckle	<p>“Freckle provides content at the students’ independent level, which I think can be effective for English Learners because it makes the material accessible to them. Freckle math will identify if a student needs review of a concept taught earlier, and then provide the appropriate review for the student.” - Mrs. Red</p>
iReady	<p>“As a district, we're going to be transitioning away from Lexia Core 5 to iReady, which I'm not thrilled about. First of all, it's hard to know for sure what they're doing, because I can't really listen to it. They're all listening to it, so they all have to have their headphones on. But from what I understand, there is no option for translation, and that is the problem with the program.” - Mrs. Orange</p>
Talking Points	<p>“Our district has Talking Points, which is a nonprofit organization that created a text messaging app that automatically translates. So I can text in English, and it will turn it into the native language of the family - that is set up seamlessly using our student information database. So it pulls automatically when students are entered into our system when they register and that sets up Talking Points. So it automatically sets them up. Then at the beginning of the school year, they'll get my text messages, I can text to the whole class, or I can text to groups of students or I can text individually, and the parents only see their own text, they don't see what everyone else is seeing. And that's been great.” - Mrs. Orange</p>

Discussion

Technology for Literacy

When analyzing the data collected from both the classroom observations and the teacher interviews, researchers were able to identify some key themes present across the data. While some of these themes aligned well with what major ideas were identified in the literature review, there were also new key points brought to light that differed slightly from previous research findings. First and foremost, based on what researchers found in this study, teachers place less emphasis on speech-to-text and/or text-to-speech technologies and focus more on those that build literacy skills. For example, multiple teachers discussed the use of both iReady and Lexia Core 5, which are online reading literacy programs that are adaptive and provide teachers with reports on student progress. It is common that school districts will use either iReady or Lexia Core 5 as they could be considered competitor products, but the consensus is that Lexia Core 5 better meets the needs of ELs.

Researchers learned that, with iReady, there is not yet any option for translation into any other languages. The problem with this is that, even if it tests the students' literacy skills and places them at an appropriate level, there may be a gross misrepresentation as to where they should be placed due to a language barrier. If instructions on how the testing process works are not presented in a language that the student understands well then performance may be hindered due to a lack of understanding of the task at hand rather than lower literacy skills. One teacher, Mrs. Orange compared both iReady and Lexia Core 5, and with regard to iReady, explained, "First of all, it's hard to know for sure what they're doing, because I can't really listen to it. They're all listening to it, so they all have to have their headphones on. But from what I understand, there is no option for translation, and that is the problem with the program."

Meanwhile, Lexia Core 5 does have the option for translation into many different languages and may be considered a better option for ELs. This program, in contrast with iReady, delivers instructions, as well as the initial assessment, in the students' first language to appropriately determine their level of proficiency before beginning the lessons in English. With that, Mrs. Orange also stated that, "Their initial assessment, the directions are given in the native language, it can be set up like that. So even though the exercises and the development is in English, they at least know what they're supposed to be doing." In fact, Lexia Core 5 is preferred over iReady to the point that teachers whose district is switching from Lexia Core 5 to iReady next school year are outraged and expressed the loss of learning that will take place for EL students.

Technology Integration in STEM

Another key theme highlighted in the data collected was the importance of technology use during STEM lessons for ELs. Teachers expressed great support for an online math program, STMATH, that some of them even use daily as an integral part of their math lessons. Like iReady and Lexia Core 5, STMATH is adaptive and advances students at their own pace as they continue to complete puzzles based on their level. According to inclusion classroom teachers, the major benefit of STMATH to ELs in particular is that there is not any language actually being used during these math puzzles. Rather, they exclusively use pictures, numbers, and diagrams to provide instructions as to what they should be doing. When asked about STMATH, Mrs. Yellow told researchers, "Our district-wide math program is STMATH, where the language is not involved at all. So it is fabulous for learners of English. Yeah, it's fabulous for everybody, but especially ELs, because it takes all that language out of it. So they are really just manipulating and problem solving." By removing the language entirely, STMATH levels the playing field by

providing ELs with an equal opportunity to succeed and focusing solely on the math concepts rather than the language surrounding them.

Supplementing Language Skills and Background

The data also highlighted the importance of using technology to supplement the basic grammar and language skills that native English speakers acquire automatically through language development, as well as for background building and activation. Teacher interviews uncovered that most of them relied heavily on BrainPOP Jr. with an EL add-on as a way to introduce new topics in their classrooms. One of the major benefits of BrainPOP Jr. EL is that it has much more elementary vocabulary woven throughout the videos, which, when paired with the images used throughout the videos, increases the vocabulary of ELs and helps them widen their mental schemas. Additionally, there are videos that are specifically tailored to introducing foundational grammar concepts that do not need to be explicitly taught to native English speakers due to the fact the skills are learned implicitly through language development. An example of this is how, in English, adjectives used to describe nouns are said before the noun in a sentence, which is something English speakers learn automatically, but may be a contradiction to an EL's first language. BrainPOP Jr. ELL was highly recommended by Mrs. Green, who said, "BrainPOP Jr. for ELLs is great because it is dense with language and vocabulary. Honestly, its language rich features are a major benefit to all students." With that in mind, BrainPOP Jr. ELL addresses grammatical issues that some teachers may not even be aware of, considering those skills develop organically in those that speak English as their first language.

Parent-Teacher Communication

Finally, and perhaps most importantly, these observations and interviews highlighted the communication between the students' parents and teachers as a key component for student

success. One problem that arises when parents do not speak English proficiently is that information is not appropriately conveyed and things may get missed. Not only that, but parents may struggle to help their children if they do not have the language needed to understand what is expected of their students on a daily basis. According to the teachers' interviews, this problem was exacerbated during fully remote learning with COVID. Seemingly simple issues to resolve, such as closing out of a pop-up ad on the student's Chromebook or making sure their children were logged onto their Google Meet lesson on time, became insurmountable for some parents because they did not possess the language needed to understand what they had to do.

Luckily, there is technology out there to help combat this language barrier, one of which being Talking Points. Teachers like Mrs. Orange, described Talking Points as, "... a nonprofit organization that created a text messaging app that automatically translates." She then went on to explain, "So I can text in English, and it will turn it into the native language of the family - that is set up seamlessly using our student information database. So it pulls automatically when students are entered into our system when they register and that sets up Talking Points. So it automatically sets them up. Then at the beginning of the school year, they'll get my text messages, I can text to the whole class, or I can text to groups of students or I can text individually, and the parents only see their own text, they don't see what everyone else is seeing. And that's been great." By using this software, both the parent and the teacher can have a conversation with the other in their own language without having to do any actual translation. With that in mind, Talking Points is a great resource for school districts with high EL populations to ensure that any and all information that needs to be sent home to parents is being done efficiently, while still taking into consideration the language that the parent is most comfortable communicating in.

Overall, researchers found that there is so much technology being used in the classroom to help provide ELs with more equitable access to educational content. However, it is critical that both teachers and administrators do their research as to the capabilities of certain programs, especially regarding translation, if they are considering using it with ELs. Although there is still work that needs to be done so that ELs are getting the education that they deserve, there are existing technologies to help bridge the gap between language and content. Now it is up to districts to take advantage of them so that no more ELs slip through the cracks of an education system that was not initially designed for them.

Conclusion

Based on all the data researchers collected throughout this study, they were able to derive some key educator takeaways from the major themes of the research. First of all, it is important that educators meet all students, but particularly ELs, at the level they are at. An example of this may be delivering instructions in the student's first language so that they have a clear expectation as to what is expected of them until they are more comfortable with English. Ensuring that the technology that is being used has options for translation may require a bit of research to be done by the teacher, but it could make all the difference in student achievement amongst ELs. With that in mind, EL educators should become familiar with and comfortable using translation apps, such as Google Translate, so that they are able to seamlessly integrate it into their lesson to provide differentiated instruction for ELs if need be.

Additionally, there are more ways to integrate technology into science and mathematics, that still maintain access to content for ELs, than many teachers may be aware of. It is important that teachers take advantage of technology like STMATH that helps to eliminate the need for language in mathematics as a whole to prioritize math concepts rather than the language surrounding them. By doing so, teachers may be actively working to reduce the onset of math phobia in students, especially in ELs. And finally, it is crucial that teachers prioritize communication with parents and ensure that everyone involved is receiving information in a language they understand at a proficient level. By doing so, teachers are helping their students by working to provide their parents with the tools needed to assist their children in a language they can actually understand.

References

- Arcon, N., Klein, P. D., & Dombroski, J. D. (2017). Effects of dictation, speech to text, and handwriting on the written composition of elementary school English language learners. *Overcoming Learning Difficulties: Reading & Writing Quarterly*, 533-548.
- Bailey, C. A. (2018). *A guide to qualitative field research*. Thousand Oaks, California: SAGE Publications, Inc.
- Bialik, K., Scheller, A., & Walker, K. (2018, October 25). *6 facts about English language learners in U.S. public schools*. Retrieved from Pew Research Center:
<https://www.pewresearch.org/fact-tank/2018/10/25/6-facts-about-english-language-learners-in-u-s-public-schools/>
- Brown, S., & Allmond, A. (2021). Emergent bilinguals' use of word prediction software amid digital composing. *International Literacy Association*, 607-616.
- Chambers, M. (2021). Assistive technology critique: Don't forget about text-to-speech. *Adult Learning*, 99-100.
- Chen, C.-M., Tan, C.-C., & Lo, B.-J. (2013). Facilitating English-language learners' oral reading fluency with digital pen technology. *Interactive Learning Environments*, 96-118.
- Darling-Aduana, J., & Heinrich, C. J. (2018). The role of teacher capacity and instructional practice in the integration of educational technology for emergent bilingual students. *Computers & Education*, 417-432.
- Lee, S., Kuo, L.-J., Xu, Z., & Hu, X. (2020). The effects of technology-integrated classroom instruction on K-12 English language learners' literacy development: a meta-analysis. *Computer Assisted Language Learning*, 1-32.

- Liu, M., Navarette, C. C., & Wivagg, J. (2014). Potentials of mobile technology for K-12 education: An investigation of iPod touch use for English language learners in the United States. *Educational Technology & Society*, 115-126.
- Massachusetts Department of Elementary and Secondary Education. (2021). *English learner education*. English Learner Education Vision & Blueprint - Massachusetts Department of Elementary and Secondary Education. <https://www.doe.mass.edu/ele/>.
- Rodriguez, D., Carrasquillo, A., Garcia, E., & Howitt, D. (2019). Factors that challenge English learners and increase their dropout rates: recommendations from the field. *International Journal of Bilingual Education and Bilingualism*, 1-17.
- Sandberg, J., Maris, M., & de Geus, K. (2011). Mobile English learning: An evidence-based study with fifth graders. *Computers & Education*, 1334-1347.
- Shadiev, R., Hwang, W.-Y., Huang, Y.-M., & Liu, C.-J. (2015). Investigating applications of speech-to-text recognition technology for a face-to-face seminar to assist learning of non-native English-speaking participants. *Technology, Pedagogy and Education*, 119-134.
- Terrazas-Arellanes, F. E., Gallard M., A. J., Strycker, L. A., & Walden, E. D. (2018). Impact of interactive online units on learning science among students with learning disabilities and English learners. *International Journal of Science Education*, 498-518.