

Background Research (Project Abstract, Literature Review, Comparative Review, Expert Interview Plan)

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Project Abstract

Findings

After reviewing potential domains of interest, we decided to further investigate the state of ELL (English-language learner) education, current problems and challenges in this area, and how its implementation affects students' lives, both in and out of the classroom. The first surprising finding we came across was the correlation between ELL student status and higher rates of high school dropout, significantly lower standardized test scores, lower cumulative GPA, and decreased access to advanced courses in the future. Additionally, students with an ELL classification make up a disproportionately high percentage of students in Special Education programs, which often do not lead to opportunities for advanced learning environments later on.

Our second finding is that not only the language barrier impacts educational attainment. There is also a disconnect in the values and requirements of parental participation in the school environment and in the expectations of student activity in school and school-related communities. In addition, researchers note that ELL students are unsupported with regards to seeking higher education due to lower financial stability and, consequently, restricted access to preparatory resources. Research also suggests that ELL students are hindered by not participating in the class environment, but technologies like Microsoft Translator for Education from our comparative review can help students get involved with the discussions.

Our third finding was that technology and STEM can serve as educational enhancers that improve the experience and performance of ELL students. Regarding technology, studies show that ELL technological tools can be used to improve performance by providing individualized attention to learners. AI has also been widely used in education technology, from technology-enhanced learning tools for teachers to learning management systems for organizing content. From our comparative review, we found that there are numerous technologies that help teach language like Duolingo, Rosetta Stone, and Magiclingua, as well as technologies that help teachers manage their classroom like Grove Learning. Regarding STEM, we saw that incorporating language into STEM classes can be particularly helpful to ELL students. For example, research shows that math and science teachers can support their students' language development processes in class and through specific activities.

Areas of Further Research

We want to investigate how technology is used by both teachers and students. For ELL teachers, is technology incorporated in their teaching methods, what technologies do they typically use, how did they discover these specific tech platforms, and how they decide which technologies to use? For ELL students, do they have access to technology, do they face any barriers to using technology, and are they typically tech-savvy?

We also want to further research the broader educational experience and performance of ELL students in non-ELL classes (i.e. science, social studies), as well as the teachers' experiences teaching these students. Are ELL students able to handle the switch between ELL and non-ELL level classes? What cultural education, if any, exists for teachers?

Finally, we are interested in researching external factors that could affect ELL students. How do ELL students interact with their peers? Do they feel like a part of the community? Are parents willing to get involved with the school if they are able? What is the discrepancy of resources and experiences in different income areas and locations, and what impact do these circumstances have on students' education?

Literature Review

1. Immigrant and Refugee ESL Students' Challenges to Accessing Four-Year College Education: From Language Policy to Educational Policy

<https://www.tandfonline.com/doi/pdf/10.1080/15348458.2010.517693?needAccess=true>

This article investigates what the barriers are to ESL students' gaining access to higher education. The authors argue that the current system of ESL, which focuses largely on English language proficiency in academic writing, does not provide aid in areas of ESL student need, instead pointing to the financial and systemic struggles of immigrant families.

2. "Why Didn't They Show Up?" Rethinking ESL Parent Involvement in K-12 Education

<https://teslcanadajournal.ca/tesl/index.php/tesl/article/view/29/29>

This paper argues that there is a severe disconnect between teachers and parents of ESL students; this disconnect lies in a different value system with regards to educational elements. The article calls for more research and effort on the side of the teachers to investigate not what ESL parents are lacking, but how to tap into the resources they can bring to the table.

3. Disproportionate Classification of ESL Students in U.S. Special Education

<https://files.eric.ed.gov/fulltext/EJ1017754.pdf>

This article investigates some of the possible reasons for why there is such a discrepancy between ESL and non-ESL elementary-schoolers classified as "special education" students. These reasons include lack of teachers' professional development in areas that would make

them qualified to instruct second-language learners and lack of response from additional support services.

4. Understanding the Epistemological Divide in ESL Education: What We Learned From a Failed University–School District Collaboration

<https://journals.sagepub.com/doi/pdf/10.1177/0042085913478624>

The authors share features of successful ESL education programs and findings from a school district that asked them to redevelop its ESL program. They contrast their program as one guided by social justice principles compared to an existing system based on neoliberal educational discourse and deficit constructions of ELLs and Latinx students.

5. Language, Literacy, Content, and (Pop) Culture: Challenges for ESL Students in Mainstream Courses

<https://www.utpjournals.press/doi/abs/10.3138/cmlr.58.1.103>

This article details that, while “mainstreaming” ESL students (i.e. teaching them together with native English speakers, not in separate classrooms) appears to be a more inclusive educational model, it does pose several challenges for ESL students and their teachers, especially for social studies. ESL students struggle when assigned readings other than a standardized textbook (a larger issue when reading materials don’t have diagrams, as they might in the sciences); and if teachers slow down the pace of oral instruction to cater to ESL students, the rest of the class often becomes unruly.

6. Academic Achievement and Course Taking Among Language Minority Youth in U.S. Schools: Effects of ESL Placement

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4244003/>

This paper investigated the “effects of ESL placement on college preparatory enrollment and academic achievement among language minority students.” It found that ESL placement provided no benefits to students and actually had negative impacts on science enrollment and cumulative GPA when compared to other students that had similar language proficiency but were not placed in ESL courses. The authors believe that this may be because ESL placement limits enrolling in advanced electives, reduces interaction with other peers, and focuses on graduation requirements instead of academically challenging work, essentially translating “limited English proficient ELL status into limited academic aptitude.”

7. Promoting ELL Parental Involvement: Challenges in Contested Times

<https://eric.ed.gov/?id=ED506652> / <https://files.eric.ed.gov/fulltext/ED506652.pdf>

The authors discuss that ELL parents face many barriers to engagement with schools, such as lack of English proficiency and high education, cultural differences, and logistics problems, as well as school-based barriers like a negative school environment and “unidirectional approach to parental involvement.” Thus, the paper encourages that schools move from traditional to non-traditional models of ELL parental involvement by incorporating parental empowerment,

integrating community, supporting families, and making the communication more culturally and linguistically accessible.

8. The Role of Schools in the English Language Learner Achievement Gap

<https://eric.ed.gov/?id=ED502050>

Published in 2008, this study examines the ELL performance gap in mathematics across public schools, as ELL students tend to have lower mathematics scores compared to non-ELL students, including major racial/ethnic groups. ELL schools also tend to have higher student-to-teacher ratios, where the schools may be under-resourced. Many schools with high numbers of ELL students report high numbers of economically disadvantaged students.

9. The Use of Technology in English Language Learning: A Literature Review

http://ijreeonline.com/browse.php?a_code=A-10-25-4&slc_lang=en&sid=1

Surveying the development of technology in ELL over the past decade, this study recommended adding teacher training on using new technologies, providing special assistance to teachers for ELL, and helping teachers create a pattern of technology-integrated lessons. The authors claim that ELL technological tools should be fit according to how the student is learning and each student's individual needs.

10. Towards Inclusive Education in the Age of Artificial Intelligence: Perspectives, Challenges, and Opportunities

https://link.springer.com/chapter/10.1007/978-981-13-8161-4_2

To make education more inclusive and accessible, AI has been applied in two major areas: technology-enhanced learning (TEL) tools for teachers (training games, intelligent tutoring systems, MOOCs) and learning management systems (LMSs) for organizing content (grad books, exams, forums). These tools need to understand sociocultural imbalances and economic differences to make a tangible impact on the U.S. education system.

11. Principles for the Design of Mathematics Curricula: Promoting Language and Content Development

https://ell.stanford.edu/sites/default/files/u6232/ULSCALE_ToA_Principles_MLRs_Final_v2.0_030217.pdf

The study provides guidance on how mathematics teachers can support their students' language development processes through math, especially ELL students. Their framework involves support sense-making, optimizing output, cultivating conversation, and maximizing linguistic and cognitive meta-awareness.

12. Language Demands and Opportunities in Relation to Next Generation Science Standards for English Language Learners: What Teachers Need to Know

<https://ell.stanford.edu/sites/default/files/pdf/academic-papers/03-Quinn%20Lee%20Valdes%20Language%20and%20Opportunities%20in%20Science%20FINAL.pdf>

This paper explores learning opportunities in the science classroom for ELL students by leveraging the ELL students' own backgrounds. While science is typically taught in English and removed from culture, the authors recommend that teachers should seek ways to integrate the students' own home background, culture, and language when teaching science.

13. How Technology Supports English Learners in K-12 Schools

<https://edtechmagazine.com/k12/article/2020/01/how-technology-supports-english-learners-k-12-schools>

Research demonstrates that developing relationships with ELL families improves children's educational outcomes, but teachers struggle to do so due to language and cultural barriers. This article covers technology that can help solidify these relationships: namely, Microsoft Translator, an application that provides live captioning and translation to assist ELLs in the classroom and their parents in multilingual parent-teacher conferences, and Flipgrid, a video recording tool that helps families break down language barriers between home and school.

14. Coronavirus' Online School Is Hard Enough. What If You're Still Learning to Speak English?

<https://www.usatoday.com/in-depth/news/education/2020/05/14/coronavirus-online-classes-school-closures-esl-students-learn-english/5178145002/>

With the onset of the coronavirus pandemic and the shift to online schooling, ELL students are at a particular disadvantage; some of the fastest-growing numbers of school-aged ELL students are in areas with little prior experience serving them. This news article points to a few challenges for ELL students made particularly difficult in a pandemic: limited access to technology, a feeling of isolation aggravated by screen learning, and a need to hold a job outside school (for ELL teenagers), making online work much more difficult.

15. What is the Difference Between ESL and ELL?

<https://www.topeducationdegrees.org/faq/what-is-the-difference-between-esl-and-ell/>

English Language Learners (ELLs) are students of any nationality, age (typically below 21), or immigration status whose home-speaking language is not English. As a broader term than English as a Second Language (ESL) learners, students could receive special instruction, but do not have to be removed from the class for separate learning.

16. What is an ESL Teacher?

<https://www.eslteacheredu.org/what-is-an-esl-teacher/>

Around 10% of students in public schools are English as a Second Language (ESL) learners or ELLs. ESL students receive specialized instruction outside of the classroom; however, less than 1% of public school teachers are ESL teachers, highlight higher demands for an increasingly culturally diverse country.

Comparative Review

As part of our comparative review, we considered language-learning platforms, teacher management software, translation tools, and video-chat or other educational integration programs:

Comparator	Description	Pros	Cons
Duolingo	App and website that teaches a foreign language through short exercises and gamification	<ul style="list-style-type: none"> ● Simple, intuitive interface ● Incorporates multiple ways of teaching ● Has a way to test your knowledge ● Sends reminders ● Provides reinforcement of words learned ● Add incentives like streaks, rewards, and badges ● Good as a supplemental tool ● Free to download 	<ul style="list-style-type: none"> ● Starts questions right away without a learning section ● Testing interface can be overwhelming when learning sound/pronunciation, new letters/characters, and meaning all at the same time ● Cannot progress to other levels without finishing earlier levels ● Adds restriction to funnel people towards buying premium version ● Not sufficient to learn completely new language ● Purchases within app for “effective” experience ● Gamification can be an eventual deterrent ● Little cultural context taught along with the language
Rosetta Stone	Computer-assisted foreign language learning software	<ul style="list-style-type: none"> ● Uses audio and visual aids to learn ● Includes images, text, and sound to teach reading, writing, and pronunciation ● Gives grammar support ● Self-paced ● Various language support ● Varying levels 	<ul style="list-style-type: none"> ● Can be slow and repetitive ● Long exercises ● Subscription fee for schools (normally; they did make an exception in March 2020 due to the pandemic, however)

			<ul style="list-style-type: none"> ● Requires sound and tech support ● Individualized focus
Magicingua	Language-learning app with AI chatbot	<ul style="list-style-type: none"> ● Mobile app with iOS and Android support ● Allows full conversations ● Safe, risk-free environment without judgment ● Can eventually speak with a native speaker 	<ul style="list-style-type: none"> ● No official launch (in beta) to compare ● No cost to compare
Grove Learning	Teacher management platform	<ul style="list-style-type: none"> ● Provides content all in one place for students and teachers ● Teachers can track student progress ● VR Management allows for students to have experiential education 	<ul style="list-style-type: none"> ● Not super accessible right now due to high costs of VR ● Right now, small-scale
Non-Native English Speaker Newspaper	Information transfer (for speakers of a different language)	<ul style="list-style-type: none"> ● Allows non-native English speakers to understand what is going on in the news without the barrier of technical/scientific/legal jargon 	<ul style="list-style-type: none"> ● Not applicable to everybody
In-Text Word Translation and Definitions	Information transfer (for speakers of a different language)	<ul style="list-style-type: none"> ● Provides immediate definitions of words in articles/research as well as a translation of word and definition in users' language of choosing 	<ul style="list-style-type: none"> ● No failsafe for special expressions or untranslatable words/phrases
Microsoft Translator for Education	Application that live translates classroom content	<ul style="list-style-type: none"> ● Provides live captioning and translation in the classroom ● PowerPoint add-in ● Offers over 60 languages ● Conversation feature to translate conversations 	<ul style="list-style-type: none"> ● Still a bit slow, especially if people are speaking quickly ● Some users feel that the UI of Google Translate is better ● Needs a little

		across devices (useful for parent-teacher conferences)	improvement with voice recordings
Flipgrid	Website that allows teachers to facilitate video discussions and message boards	<ul style="list-style-type: none"> • Allows students the opportunity to produce customized, individual video responses; designed for “student voice” • Youthful interface design → engaging • Helps students build social skills with each other 	<ul style="list-style-type: none"> • Social media-style features can be distracting • Difficult in a classroom if multiple students record at once • Privacy concerns if the whole class can see a student’s video

Expert Interview Plan

Our proposed expert interviews are with Sandy Wallace and Tammy Massie. Both experts are teachers currently based in San Diego, CA with 30+ years of teaching experience, several of which have been in ESL and bilingual education. Sandy has focused on this domain for the past 5-6 years. We believe that they will have valuable insights on what the current landscape for ESL education looks like in schools today (both in theory and in practice). In addition, we think that they will likely have thoughts on what could be improved inside and outside of the classroom, as well as opinions on what the specific role of a teacher is in these environments. We have scheduled these interviews for this week at a time that is mutually agreed upon and convenient.

Needfinding Plan, Discussion Guide, & Start Recruiting

Team Coterm: Kayla, Kimberly, Misbah, and Anjini

Needfinding Plan

Focus

The focus of our team's research is to better understand the needs of English Language Learners (ELLs) and improve their experiences and outcomes, especially in resource-limited K-12 schools. Our general target group is U.S. public K-12 students. Through our background research, we categorized and examined gaps in the U.S. public K-12 ELL education system and the ELLs' overall academic experience and developmental outcomes. As stated above, we plan to investigate ELL needs and how we can improve both their academic, social, and personal growth. This goes beyond English language learning, broadly categorized as improving overall academic growth beyond ELL, understanding external factors that influence ELL students, and using technology and STEM to enhance ELL experiences/outcomes.

Target Interviewees

Screening Criteria

- Must be based in the USA
- Must have experience in the public K-12 education system
- Experiences:
 - Must have experiences related to ELL (Student, teaching, etc.)
- Expertise in Education (Academia, teaching, childcare, policy, first-hand experience, etc.)
- Technical Relevancy (Education technology tools, CS experience in education, etc.)

Participant Interviewee Categories

We are planning to interview at least 1-5 participants from each category, with emphasis on students, ELL researchers, and teachers for first-hand experience. However, we want to look across backgrounds to have a comprehensive understanding of ELL in the classroom and beyond. Below we have included our distribution for our current and intended participants.

- Education Academic Researchers: 1-3
- ELL Teachers (including counselors and administrators): 2-3
- ELL Students: 2-3
- ELL Parents: 1-2
- EdTech and ELL Technology Experts: 0-1

- Education Policymakers: 0-1
- Social Workers: 0-1
- Child Development and Mental Health Experts for K-12 Students: 0-1

Potential Interviewees

- Stanford School of Education Researchers
 - Amado Padilla
 - Guillermo Solano-Flores
 - Claude Goldenberg
 - Guadalupe Valdes
 - Jonathan Rosa
 - Kenji Hakuta
 - Ramón Antonio Martínez
- Teachers with ESL/Bilingual Education Experience
 - Barbara Magid - speech therapist and ESL teacher, 30+ years teaching experience
 - Sandy Wallace - ESL teacher, 30+ years teaching experience
 - Tammy Massie - speech therapist and ESL teacher, 30+ years teaching experience
 - Nancy Moiseve - Elementary Educator, 30+ years of teaching experience
 - Jamie Harris - Elementary Educator
- Students
 - Sarina Fereydooni - High school student, immigrated from Iran 4 years ago
 - Samia
 - Feriba
- People in EdTech
 - Sean Strong - CEO of Grove Learning, a platform for teachers to manage content and progress while students are using VR for experiential learning
- Stanford Faculty (Non-Education Department)
 - Helen Quinn—SLAC physics emerita professor with long-term involvement in science education and continuing education for science teachers.
 - Chris Piech—CS professor specializing in education and understanding learning processes.
- Social Workers

- Liz Magid -- specializes in mental health and advocacy for students in low-income settings.

Recruiting Plan

Outreach Plan

To adapt to the remote environment and our focus group within American public K-12 ELL students, we are focused on 1-1 interviews and questionnaires to select groups. This intends to gain comprehensive insight on first-hand ELL experiences and beyond. Currently, we are in the process of outreach. From early to the rest of the week, we will hold interviews.

9/20–9/21:

1. Schedule interview with two experts (ELL teachers Sandy Wallace and Tammy Massie)
2. Review interviewee list and prioritize contacts based on relevancy to screening criteria, connection/accessibility in our network, and immediacy of response. (In-progress)
3. Write an outreach email template. (Complete)
4. Start the first wave of outreach with emails and contact with at least 15 people. (In-progress)

9/22–9/27:

1. Hold interviews with ELL teachers Sandy Wallace and Tammy Massie
2. Respond and hold interviews.
3. Initiate a second wave of outreach to remaining participants on the list as needed.

Network

We are first planning to leverage our personal network and Stanford affiliations, where we are reaching out to personal connections working in education, past colleagues (friends and family), former students that we have taught, and Stanford affiliated members. If time permitting, we also plan cold-calling individuals outside our personal network, notably in education technology and non-profit educational organizations.

Logistics

- Length of Interviews: 30-60 minutes

- Interviewers: Each team member will be in charge of outreach for at least 5 participants (~20 outreach). Due to schedules and geographic distance, interviews will include at least 1 interviewer and 1 interviewee. However additional interviewers may be added to sessions on a case-by-case availability basis to take notes or observe.
- Equipment: Interviews will be held over Zoom. To assist this interview structure, interviews will be recorded and transcribed using OtterAI upon consent of the interviewee. If the interviewee declines a recording, we will add an additional interviewer to take notes. Google Drive will also be used to organize notes.
- Consent Form: See draft below:

Consent & Release Form

I understand that:

- The purpose of this interview is to gather information for research purposes only and may include discussions about a product or service that is not yet available to the public and is thus confidential.
- Privacy: I am voluntarily providing confidential personal data to the interviewer. As a condition of my participation, I understand that my comments, identity, and identifiable information will be held in confidence and will be available to no one other than the project team. I will not be identified by full name in any report and my personal information will be kept completely confidential.
- This is a volunteer interview and I am not required to take part. I can leave at any time.
- Today's session will be recorded as an aid for the people conducting the study. The recording is for internal use only.

We appreciate your participation.

Print Name

Signature

Date

Discussion Guide

Introduction

We are currently working on a project to improve the experiences and outcomes for ELL students in the U.S. K-12 system. With your expertise in [domain], we are interested in learning more about this area to design solutions that could help address ELL needs. Please feel free to tell us your overall experience.

Topics to Cover

- Interviewee Background
- Connection to ELL and education
- What Has Currently Worked Well for ELL students
- Problems related to ELL
- Interviewee Domain-Specific:
 - Student Experiences
 - Teaching
 - Research
 - Technology
 - Beyond Classroom Learning
- Feedback

Specific Questions (In-progress draft)

- General
 - What would be the smallest change that would have the most impact for ELL students?
- Domain-Specific
 - Research
 - How do you envision the future of ELL learning?
 - What areas do you think need to be addressed?
 - Education Technology and STEM:
 - In what ways can STEM teachers or parents encourage ELL learning?
 - How can we bridge home cultural environments to better connect to STEM learning?

- Student Experiences
 - How would you describe your current experiences and feelings toward school?
 - What are you most excited about?
 - Do you have any certain concerns both related to school and beyond the classroom?
 - What coursework or instruction do you receive related to ELL?
 - How were you placed into ELL, and how have your ELL experiences been?
 - How is the transition between ELL and non-ELL classes
 - Do you feel like a part of the school community?

- Teaching
 - (Non-ELL teacher) What differences do you see between ELL and non-ELL students?
 - What methods have been most effective in helping ELL students?
 - What are barriers that are holding you back as a teacher? What would be some ways or tools that could help you?
 - What are trends in ELL that you predict?
 - What technology is incorporated in your teaching methods?
 - What technologies do you typically use?
 - How did you discover these specific tech platforms, and how you decide which technologies to use?
 - What cultural education exists for teachers?

- Parents
 - What is your current involvement in your students education?
 - How do you feel about their academic progress?
 - Are you willing to get involved with the school if you are able?
 - [Question understanding socioeconomic background]

- Technology
 - How do you factor in social and cultural backgrounds in developing your ELL technology?
 - What are barriers to access for bringing your technology to resource-limited schools?

- Beyond Classroom Learning

- Organizations:
 - What has been the impactful or meaningful experience for you in working with these groups?

Recruiting Update

Team Coterm: Kayla, Kimberly, Misbah, and Anjini

Currently, we are in the process of scheduling and holding interviews. We already have two interviews scheduled (ELL teachers Sandy Wallace and Tammy Massie) and have begun outreach for others. Each member plans to reach out to at least 5 possible participants for at least 2 interviews each. In preparation for outreach and interviews, we drafted an email template, wrote consent forms, set-up OtterAI for interview transcriptions, and created a Google Drive for interview notes. See our Needfinding Plan and Discussion guide for more details.