# EDUCATION TOOL FOR STUDENTS
(Technical Topic)


# TECHNOLOGICAL INTEGRATION IN EDUCATION SYSTEMS IN BOLIVIA AND THE UNITED STATES
(STS Topic)


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On my honor as a University Student, I have neither given nor received
unauthorized aid on this assignment as defined by the Honor Guidelines
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**Introduction**

In 2009, for all US K-12 public schools, forty percent of teachers reported that students used computers during class, and "Ninety-seven percent of teachers had one or more computers located in the classroom every day" *(*Gray, Thomas, & Lewis, 2010, p. 3). Clearly, the relevance and popularity of the computer seemed to be common in the public education sphere. Furthermore, by 2025 the global market for software in education was predicted to be 130 Billion USD *(*Frost & Sullivan, 2018, as cited in Trade and Investment Commision., 2018, p. 4*)*. This indicates that technology is becoming integral to our educational systems in public schooling and elsewhere. However, technological integration is not without drawbacks. In a study where student laptop use was examined, the results were moderately positive due to the distractions that laptops permitted *(*Zheng, Arada, Niiya, & Warschauer, 2014*)*. That is why for my STS research, I decided to focus on how technology and public education have been integrated in the last decade and where it can go in the next decade. In particular, for the United States and Bolivia. I decided to focus on the United States since it is where my team intends to release our technical projects and being aware of the innovation or lack thereof, is relevant to avoid similar mistakes. Meanwhile, I picked Bolivia since it shares many institutional, historical challenges, and circumstances of other Latin American countries. Furthermore, there isn't much STS literature with Bolivia compared to Mexico and Brazil. In an effort to add more diversity and a new country to examine, I picked Bolivia. It is a country that if analyzed well in my research can provide better information and context for itself and its similar countries regarding how they can approach technology in their public education systems.

Regarding my technical projects, they are done in the educational sphere as software applications. A key point of interest in the development of the projects is to empower students and faculty. We believe that by making that one of our goals, we can start and be part of a technological culture shift that inspire and influence other software designers.

**Technical Project(s):**

I and my teammate have decided on building a suite of products focused on empowering students and supplementing how students succeed in and out of the classroom. Initially, we planned to make one application. However, we saw ourselves capable of building multiple applications and saw the need in our communities for their development. Through reflecting on our own experiences, we found three situations where learning becomes bottlenecked and inefficient. We both had the experience of being TA's, being students, and being immigrants. Through our perspective, we sought to resolve the challenges that we experienced and prevent future struggles for students. While simultaneously, ensuring that it's access and customization are suited for each individuals' needs. The three products we are focused on creating are called Q-Dispatch, Word Assistant, and Practical Exams.

Q-Dispatch

Q-Dispatch is an application intended to facilitate queueing for instructor/TA office hours through logging each help request from students, removing the cognitive overhead of tracking where students are in a queue, and facilitating student collaboration. The way that it works is by having an instructor who is interested in adopting the platform upload their class rosters and

assign TAs. Every person added to a class is considered a member including the instructor. Each

member that the instructor adds, is either designated a student, TA, or co-instructor. Now the

instructor(s) would create an office hour schedule and assign the relevant TA's to their hours.

Now, when office hours begin, students can send an office hour request in person or online and

can see where they are in the queue. In these requests, it is required that they provide a topic and

a description of the question. This allows the instructor(s) and TAs to see the types of requests

that students are struggling with and consequently update the curriculum accordingly. Due to the

COVID-19, we find this application has utility in how online sessions are being conducted.

Word Assistant

Word assistant is a chrome extension and mobile application intended to help

international students and domestic students comprehend English material by focusing on

understanding vocabulary. As immigrants, my teammate and I struggled with understanding the

English language in the U.S. Due to our limited vocabulary, every question posed a challenge to

not only understand the question but the words constituting its makeup.

For the mobile app, the method in which it functions is by hovering one's camera over words

which are confusing and extracting the definitions of the words in English or the users' native

language. Once a word is selected it has the option to be saved to a dictionary where students can

look up their words later. Through notifications, we are able to evaluate and help improve the

retention of those words.

With the chrome extension, we can achieve a similar function but for browsers. This can be

useful as students can now better understand questions without having to consult online

dictionaries. With the chrome extension, there is one more feature that students can use and that

is a class crowdsourced dictionary of terminology relevant to the course. With a dictionary of that kind, students can better understand and work through problem sets with less misuse of terminology and more fluency of the subject. This can be done through having instructors upload a class roster which can then be used who can see the terminology of that class.

Practical Exams

Practical Exams is a website where students can more effectively review material through questions given by instructors or generated questions. The application requires instructors to upload class questions, quizzes, and prior/practice exams so that students could evaluate themselves on the website and then be suggested questions based on previous answers and time passed. An eventual goal was to be able to generate questions with a large dataset of questions and answers. We intend to do the above through natural language generation algorithms if possible. However, our primary goal is to better allow students to self evaluate in preparations for final exams.

Timeline & Status

Currently, Word Assistant mobile app and Q-Dispatch are near ready to be deployed. Both of the previously mentioned applications are due to launch at the start of Summer. For the Word Assistant chrome extension and Practical Exams, we can complete that task over the Summer and release both applications in the Fall semester.

**STS Project**

Education is the foundation of an effective citizenry and economy. As such, my research attempts to understand the growing relationship between technology and education in Bolivia and the US. I will begin the paper by investigating the cultural and historical contexts for how both educational systems were conceived. Hopefully, with whatever I may discover, there may be themes and specific actions taken by the state or society which could have redirected how technology would be integrated into Bolivia or the United States. For example, the Bolivian dictators which came to power may have had a role in how educational policy was determined and/or the US Marxist scare of the 1950s.

Next, I would find and enumerate all the technology tools/machines utilized within two degrees of separation from the classroom. Already, there is a multitude of software/tools/devices that I can identify, however, I need to find cases which as act as a representative of a domain of the public educational system. Additionally, due to there not being much information or technological adoption in Bolivia, I intend in mid-summer to survey and interview a city, suburban, and rural public schooling institutions to better understand what integration they have with mechanical and non-mechanical technology.

Once I have gathered the list of technologies in use, I will narrow them down by identifying the popularity, utility, and reach of the artifact to the student body. Then, I will use aspects of the SCOT framework (Pinch & Bijker, 1987), User's vs. Non-Users concept (Oudshoorn & Pinch, 2003) and the Politics of Artefacts (Winner, 1980) to understand the relations that exist within each technology and educational key players. SCOT by finding the relevant social groups involved in the development of technological artifacts, and then finding

the meaning that artifact has for each social group can explain the development decisions that were made on the artifact. Thus, by applying SCOT onto students, teachers, principals, administrators, the state and federal governments, as it regards to education, I can identify what political decisions or motivations guided certain actors into making decisions for the students. For example how far does liability, or image influence those with power in making technological decisions for the school? What about the constraint that elections place on governmental representatives? Could it make them more receptive to technological integration?

Regarding Non-users vs users, the consideration there, is who is this technology intended to reach and whom does it not? Are poverty-stricken areas an area of interest for technological integration? what about indigenous populations in reservations in rural areas?

With the politics of artifacts, the question is if these tools have a political agenda. Mainly if they attempt to promote more technological integration or if they serve as a means to institute control onto the student body.

Conclusion

My technical projects and STS research are in the aims of understanding technological integration in education and then using that, to inform and build tools with the awareness needed to be ethical, culturally/historically sensitive, and to promote more student empowerment.

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