ForWord: A Study on an Interactive Learning Environment in Foreign Language

Christina A. Curtis

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ForWord
a study of an interactive learning environment in foreign language

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Abstract

Keywords
interactive learning, collaborative learning, shared learning, secondary education, language, ESL, EEL, Spanish, social network, user experience, user interface, web application

With constant advances in technology, the world becomes a smaller community each day. In line with its reputation as a cultural melting pot, children of immigrants are the fastest growing student population in the United States today. It’s clear that the U.S. needs a strong approach in language education; one that can keep pace with our potential and our lives. Technology can be used to foster student collaboration and shared learning experiences, thereby increasing learner interest, motivation and learning outcomes. ForWord aims to use interaction design in foreign language education to meet this need.

ForWord has four main goals:

1. Provide a user-friendly online learning environment
2. Promote teacher-student interaction and collaboration
3. Promote student-student interaction and collaboration
4. Increase learner interest and motivation

This project takes the form of a proof-of-concept web application. The outcome relies heavily on research, design principles, user experience and human-computer interaction theory, and the use of technology to demonstrate the overarching concepts.
Introduction & Review of Literature

Introduction

While there are a number of educational tools in existence, many of those in the language-learning domain do not make use of cutting edge technologies. Textbooks are still widely used in schools and while they may offer an online component, these supplementary pieces are often lacking in engagement, student collaboration, and design. Outside of the classroom, a multitude of available software, services, and tools exhibit a range of pros and cons. Language education is an area to be explored and enhanced by technology.

Existing Tools and Technologies

As a preliminary step of an ongoing research process, it was important to review existing educational tools and services that aim to help users learn a new language. While this review included a variety of applications and software, it was in the best interest of the goals of the project to focus on the most relevant tools: the tools that had a similar mission or took a related approach to the initial concept of ForWord.

Duolingo served as an inspiration for the project, both from an aesthetic and a user experience perspective. In using the tool, it is evident that it is a strong vocabulary building resource. It showcases great design and user onboarding, and one of its largest successes is the incorporation of gamification into every aspect of its lessons. While this tool is engaging and beautifully presented, it is lacking the key elements of community and collaboration.

Livemocha, an online language-learning tool that was acquired by Rosetta Stone in 2013, takes another approach by placing importance on practice. With a focus on community, this service provides opportunities for its members to work with native speakers and build their conversational skills. Users also have access to resources to build vocabulary and learn grammar. A large benefit of Livemocha is easy access to a large pool of members with varying language backgrounds. On the other hand, peer reviews and feedback can be less than useful and there is a lack of supervision, which allows some users to take advantage of the system.
Fluenz, a primary competitor of Rosetta Stone, aims to teach language via one-on-one digital tutoring, while infusing cultural experiences and context at the same time. A series of lengthy video sessions provide the user with information that is reinforced with activities and testing. The founders proclaim that good design is relevant in education. Much of their product utilizes beautiful, full-screen photography. However, the UI (user interface) could use improvement. Similar to Duolingo, there is a lack of community and collaboration in that all interaction takes place with a digital persona. Additionally, the educational workflow follows a very linear path.

**Design for Teens and Education**

Today, children of immigrants are the fastest growing student population in the United States. Students that learn English as a second language represent 10.6 percent of the K-12 public school enrollment, with the fastest increasing numbers in grades 7 through 12, and about 79 percent of these students speak Spanish as their first language (Calderón et al. 2011). These statistics confirm the need for an educational tool such as ForWord, especially for the American student population. It was crucial to perform research on the abilities, interests, and behaviors of this particular demographic to hone in on the intended target audience: English and Spanish learners ages eleven to fourteen.

As of 2007, it was found that 93% of teens aged twelve to seventeen were using the Internet, and 64% of those teens have participated in content-creating activity (Lenhart et al. 2007). It is reasonable to assume that these numbers have only increased with the popularization of smartphone technology and the shift in online behavior that has come along with this.

The practice of sharing, whatever form the content takes, has become a part of daily life, especially for children of the tech savvy Generation Z. Social media outlets and applications promote the sharing and subsequent peer approval of information, images, and videos, both personal and popular. This peer exchange has been found to play a large role in the lives of teens (Lenhart et al. 2007). As a relatively new phenomenon, social media is yet to be fully explored in the classroom; it is an untapped instructional resource with infinite possibilities.
These possibilities need good planning and implementation if they are to come to fruition. Educational approaches that utilize technology must place high importance on usability with special consideration given to the target audience. As a generation that grew up with technology and the Internet, the teenage audience calls for certain design guidelines and design needs.

According to Nielsen Norman Group, teens perform worse than adults in website usage for three main reasons: insufficient reading skills, less sophisticated research strategies, and lower levels of patience (Loranger and Nielsen 2013). To maintain engagement, it’s imperative to provide well organized and easy-to-scan content. Teenagers place a lot of value on aesthetics and appreciate interactive features such as online quizzes, online voting, games, features for sharing pictures or stories, message boards, and forums (Loranger and Nielsen 2013).

For these reasons, ForWord presents educational material in a way that is familiar, direct, and engaging. The structure and navigation is minimal and plays off of popular social media platforms. In addition, the majority of the layout is used to display shared and collaborative content. This content comes from the users themselves, making ForWord a unique experience for each person.

The importance of language learning in schools is undeniable. With constant advances in technology, there is vast potential in the field of education. In recent years, there has been an emergence of technologies that revolutionized the classroom, such as smart boards, touch tables, and iPads. The role of digital technology in the classroom has been proven to be valuable for both learning outcomes and student motivation (Dhir et al. 2013).

Furthermore, collaboration is a significant factor in learning. Cooperative learning is defined as a systematic instructional method in which peers work together in groups to accomplish shared learning goals (Zhang 2010). This method of learning has been tied to higher achievement levels as well as positive effects on relations among students, self-esteem, long-term retention, and depth of understanding of material (Zhang 2010). With collaboration as a primary feature, this project employs technology in the classroom to achieve cooperative learning, among other instructional goals.
Process

Overview

The core concept of ForWord is to use interaction design to create a language-learning environment where users can build, share, and collaborate with one another and their educators. The target audience is English and Spanish students that range from age eleven to fourteen. As this is an extensive objective, this project takes the form of a proof-of-concept with a series of components.

The process was largely iterative and cumulative; each step and each piece shaping the others. To demonstrate the overall idea and experience, an interactive prototype of the web application was built with Axure. An instructional game demo was created with HTML5 Canvas, JavaScript, and jQuery in Adobe Flash. A promotional motion graphics piece was made in Adobe After Effects. Lastly, to provide an overview of the project and to briefly present each aforementioned component, a promotional website was built using the Bootstrap framework with HTML5, CSS3, and JavaScript. All assets were designed in Adobe Photoshop and Adobe Illustrator.

Stage 1 – Branding

The initial design work for ForWord was geared toward the overarching vision and branding. The color palette consisted of a bright medley of colors to convey the energetic nature of the tool and its youthful target audience (fig. 1). Two cooler shades of grey were utilized as neutral colors for visual organization and the increased readability of text. Based on the three primary colors, this color scheme hints at the importance of a strong foundation in any field of study. On a deeper level, it communicates the idea that there are an unlimited number of possibilities when one uses basic elements in combination.

Figure 1. ForWord Color Palette
Museo Sans was the selected typeface for ForWord branding. It is a geometric and highly legible sans-serif typeface that works well for both display and body text. It is open, friendly, and a well suited typeface for digital applications.

![Figure 2. A Sampling of Early Logo Concepts](image)

The ForWord logo (fig. 3) is based on three main concepts: moving forward, getting through something, and the creation of new elements through combination and collaboration. These ideas are the basis for the educational tool. Soft, rounded shapes give a friendly and welcoming appeal to the logo.

A repeating, square shape suggests books, screens, and boxes of content, which will be used in the tool. Via negative space, one can visualize an arrow. All of the elements are arranged in such a way to show a forward and upward directional movement. The Spanish word for forward is included in the logotype to reinforce meaning and indicate the nature of the tool.

![Figure 3. Final ForWord Logo](image)
Once the branding was underway, I began preliminary ideation and planning for the web application and the educational games. A basic UI flow diagram was created to establish high-level relationships within the app (fig. 4). At this point, the main actions and interactions were clear enough to begin developing some rough wireframes. This would be the start of a process that persisted up until the final weeks of the project, which required continual refinement.

Stage 2 – Early Concepts

Figure 4. UI Flow Diagram
The first and most crucial piece to wireframe was the content feed, as this was the primary feature of the tool (fig. 5). The feed is where the user would first land upon arriving to the site and where collaboration and sharing among users would take place. This was accounted for within the initial layout, as the feed was given the largest amount of space. Initial concepts used both a top and left navigation menu.

Encouraging interaction with the feed was one of the main goals and it was important to visually indicate this to the user. Rough concepts for the content boxes included indicators of the content creator, peer approval, a comment feed, and vocabulary tags (fig. 6). At first glance, users would be provided with numerical information, i.e. the number of users that approved the particular piece of content, and it was necessary to also give the ability to interact with and reveal the full scope of activity within a piece of content.
Based on the fact that users would build and share content, I developed three game concepts. ForWord users would ultimately create each game. This could happen directly by physically building the game within the application or indirectly by contributing content to it via the feed.

The games would make use of the uploaded photos and content, such as the vocabulary tags. Initial ideas included matching vocabulary words with content found within an image (fig. 7), matching sentences to the context of an image, and a two-player game where live conversation via message feed would guide a player to complete a puzzle that the opposing player had created.
Stage 3 – Feed Layout and Interactions 

Once the basic framework of the project was established, the next step was a deeper exploration of the feed layout and interactions. A few variations of the navigation were designed. A single, standard top navigation would maximize the amount of space for the actual content. In this case, buttons and other actionable items could be incorporated into the page itself (fig. 8). A layout with off-canvas navigation was briefly considered and later abandoned (fig. 9). It was imperative that content was not hidden or difficult to find.
Figure 8. Feed concept wireframe

Figure 9. Feed concept wireframe with off-canvas navigation
After some research and feedback from advisors and peers, it was concluded that a combination of a top navigation and a left navigation would provide the best user experience (fig. 10). Both menus would be fixed, allowing the user to continually scroll through potentially lengthy content areas without losing orientation or important features.

The left navigation would contain the items of highest importance, giving easy access to the areas of the website that users would frequently navigate between. This type of menu system has been found to be faster and more efficient to scan when presenting a minimal amount of options. It is natural for users to scan vertically from top to bottom, and a straightforward user interface was a top priority for the target audience. Using a top navigation in conjunction with the left navigation would help to separate distinct items. The top menu bar would be a domain for the logo and for actions that would apply to every area of the site, i.e. content sorting and language options.

Figure 10. Feed concept wireframe with top and side navigation
Several variations of the feed were designed to help determine the best method for displaying content and also encouraging interaction (fig. 11). Feed layout options included a grid of square content boxes that were equal in size and several versions of grids with content boxes of varying sizes, shapes, and arrangements. Would these content boxes have spacing between them or would they meet at the edges to create one large mosaic? Would the boxes have borders? The idea of borders sparked the exploration of the use of color (of borders and tags) to indicate different types of content within the feed (fig. 13). These are a sampling of design questions that were debated and answered.

Figure 11. Feed Layout Options
The next step in the process involved defining the UI elements and interactions of the content presented in the feed. Early concepts displayed the content creator and the number of peer approvals, comments, and tag words for each image. A number of concepts were designed and deliberated (fig. 12). Several options proposed showing this information by default, using icons, content bars, etc. Other ideas proposed displaying the information on hover of the image or on click of a tab or button to reveal the content. Further explorations included popups to show content, the use of a radial menu system, and dynamic indicators and buttons that would change in size or color based on the type or amount of content they represented.

Figure 12. A sampling of feed interaction concepts
The final high fidelity wireframes reveal the final design decisions (fig. 14). Many modifications were made after research, advisor and peer review, and user testing. In terms of navigation, both the left navigation and top navigation are minimal in size to give as much emphasis to the content as possible. The profile is located in the top bar, as this is an expected location for this element and its associated menu items (My Account, Settings, and Logout). Furthermore, this organizes the related items of Feed, Friends, and Games into one area in the left navigation with easy access. Left menu items are presented as icons with supporting labels to add personality while retaining quick recognition.

Figure 13. Feed interaction and content tagging exploration at a later wireframing stage
The grid system used in the feed is designed to accommodate both square and rectangular content, which can expand to a larger size and reshuffle content within the feed. Expanded views allow for content (such as the comment thread) to display as an overlay on the image. When uploading content, users are given option to choose the shape and crop of their image in order to optimize the presentation. They may upload files from their computer or from Facebook or Instagram. This gives the feeling of control and personalization that teens appreciate.

Figure 14. Final ForWord Feed Design
Borders or tags that indicate the content type were removed due to their lack of significance. Based on feedback, a discussion board was added to encourage conversation between the class and their educator. Personal text posts were eliminated from the feed. The only type of content uploaded to the feed is static images, which are optimal for tagging and game creation.
In the final stages, icons and interactions of the feed content were refined. Icons are designed to accommodate double-digit numerical values and are unified in style and weight. The peer approval feature was removed and replaced with a dictionary feature, which adds significant value to the tool (fig. 16). This is in line with the instructional nature of ForWord. The removal of the approval factor helps to avoid unfair advantages or potential peer relation issues tied to popularity.
Due to limitations on timeline and scope of this project, the Friends and Games aspects of the tool are not fully realized. Nevertheless, landing page designs were created for both pages. The Friends design took the form of a grid of the user’s peers or classmates that they are connected with via ForWord. Users have the ability to create or join a group of users. The concept is that students could collaborate on projects and share information and materials, inside or outside of the classroom.

The Games design also takes the form of a grid, and lists games that are available to the user (fig. 17). Basic information, such as the creator, title, type, best time, and total plays are available at first glance. This gives the user an introduction to the game before they commit to playing. The design for Games has two unique elements: a leaderboard and Friends Online module. The leaderboard encourages recognition and healthy competition among peers by tracking user activity. The Friends Online module provides a list of the user’s friends and their current system status (available, busy, offline). This gives the user an indication of which friends they can invite to collaborate or play games with at any time.

![Figure 17. ForWord Games Landing Page](image-url)
Stage 5 – Prototype & Game Demo

With finalized designs, it was crucial to introduce the element of interaction to bring the project to life. The prototype was used to demonstrate the overall user experience and interactions of the tool. This allowed for review and testing of the navigation and layout, as well as the application from a holistic point of view. During this process, additional items had to be fully considered and designed, such as the workflow for a user to upload content (fig. 18). The image tagging process was designed as well and incorporates an engaging drawing tool interaction (fig. 19).

Figure 18. Upload a Picture Process

Figure 19. Draw a Tag Area
After much training and trial and error, an interactive proof-of-concept was built with the prototyping tool Axure (fig. 20). Most assets were taken from the high fidelity designs and exported as separate pieces to be used in Axure. This included designing various states for buttons and other interactive elements. This proved to be somewhat problematic, as the use of high quality images increased the initial prototype load time. It was best to recreate elements in Axure where possible, and this was done with the left navigation. In hindsight, Axure may have been better suited for the creation of a lower fidelity prototype. Nonetheless, the prototype was very successful in easily demonstrating complex interactions and served its chief purpose as a proof-of-concept.

Figure 20. Creating the prototype in Axure
The HTML5 Canvas game demo is incorporated into the Axure project itself, which gave an additional layer of realism to the prototype. The game demonstrates the use of word tags in an image and how they can be used to test and reinforce knowledge in a fun way. Players must correctly match the given vocabulary words with their respective locations in a photograph.

Assets for the game were created in Adobe Illustrator and Adobe Photoshop and imported into Adobe Flash. JavaScript and jQuery were used to create a timed game where the vocabulary words are dynamic, draggable items that react to mouse events. The game went through several iterations and the final product is largely based on user feedback, collected in written form and through direct observation.

It was important to provide visual feedback to the user throughout gameplay. In the first version of the game, when a user placed a vocabulary word on an incorrect tag location, the tag icon would turn red to indicate the wrong choice. If placed on the correct tag location, the tag icon would turn green and the vocabulary word item would disappear, indicating the right choice and completion of that step.

*Figure 21. Game Demo Version 1*
Initial user testing revealed a common, primary concern: the tag icons were difficult to perceive among the content of the imagery. Other data collected indicated that the visual feedback provided, specifically the green and red color changes, weren’t apparent enough. Additionally, some users would prefer more of an introduction to the game upfront.

The second version of the game aimed to address these shortcomings. After some exploration and review, a circular overlay was added behind each tag to increase the contrast between the icon and the background (fig. 23). To increase readability, the vocabulary words were modified and set in all lower case. The definite article of each word was added ("el" or "la") to indicate the gender of the noun, as this is of great importance in the Spanish language.

In order to give more instruction to the user without increasing the amount of content, an image was designed to accompany text (fig. 24). This supporting visual helps create a stronger connection between the instructions and the actual game. An overlay was added to the screen to eliminate distractions during game play. Lastly, a countdown was added at the start of the game to prepare the user and to build excitement.

Figure 22. Written user feedback for Game Demo Version 1
Figure 23. Game Demo Version 2 Intro Screen

Figure 24. Game Demo Version 2
Stage 6 – Promotional Components

To bring each component together in one common place, a one page website was created to showcase the project and the process (fig. 25). Built with Bootstrap as a framework, the website is responsive and simple in structure. Included in this promotional website is a short motion graphics piece that was created in Adobe After Effects. It builds off of the ForWord branding to hint at the project mission and ultimately, to pique interest in the project long after it was completed.
User Testing & Feedback

Throughout the process, feedback was collected from a variety of audiences. The testing and review process included thesis advisors, RIT faculty, peers, foreign language educators, and members of the target audience and their parents. Two formal user testing sessions were conducted and each took a different approach.

The first user study was an evaluation of the initial version of the game demo (Appendix B). This session was conducted in a computer lab at RIT and had ten total participants. All users were RIT graduate students of mixed gender and ethnic backgrounds. The feedback was collected through a brief written survey. Users were provided with basic information about the demo and were asked to play the game as many times as they wished.

Once users were finished playing, they were asked to provide their feedback anonymously by completing a survey. Users were directed to rate the game across three areas on a scale of 1 (needs improvement) to 5 (strong). These three areas were design, graphics, and technical. In addition, users were asked to give their “thoughts about the game” in written form. The results revealed that the design of the game was unanimously ranked as strong (5). Both the graphics of the game and the technical aspect of the game were given an average rating of 4.1. Written comments indicated that some elements and graphics were difficult to see or understand.

The second user study was an evaluation of both the website prototype and the second version of the game demo and took the form of user observation. This session was conducted in a computer lab at RIT during the Image RIT Innovation and Creativity Festival. There were five total participants that fell within the target age group. Each participant was randomly approached from the pool of festival attendees.

Each user was quickly briefed on the main concepts behind ForWord and was introduced to the website prototype. Once the user had explored the website to their liking, I directed them to the game demo, gave them a brief overview and asked them to play. Before they began, I told each participant that I would sit with them and be available to help. I made sure they felt comfortable and explained that they could play as long as they wanted or quit at any time. Users were provided with a Spanish vocabulary cheat sheet to aid those with little or no knowledge of the language.
Once the participant agreed to play the game, I watched them closely to study their experience, taking notes on their behaviors and any perceived pain points. When the user was finished playing the game and using the website, I asked that they complete a short survey (Appendix C). In some cases, I had the opportunity to further discuss the project with the participant and occasionally their guardian as well. This allowed me to gather feedback in a casual, conversational manner.

Results of the second survey indicated that the participants responded positively to the aesthetics of the project. In a simple rating question about the visual style of the website prototype, four out of five participants gave the highest possible rating of 5 to indicate that the look and feel the website was “excellent.” In a similar question, all five participants unanimously rated the visuals of the game demo with a 4, the second highest rating on the scale.

The survey showed mixed reviews in terms of the usability of the website and game demo. In a simple rating question about the ease of use of the website prototype, participants gave an average rating of 2.2, with 1 being easy and 5 being hard. In a similar rating question about the ease of use of the game demo, participants gave an average rating of 3.6, with 1 being easy and 5 being hard. These results may be attributed to the Spanish experience levels of the participants. While the majority of the participants indicated that they had some knowledge of the Spanish language, user reliance on the Spanish cheat sheet that was provided may have hindered their experience and perception of the game. Further user testing would be required to draw clear conclusions.

Overall, the outcomes from both sessions were informative. The aesthetics of the game demo and the prototype were given high ratings. Testing results and discussion with participants indicated that most people found the project motivating. As intended, some individuals expressed that ForWord had the potential to be educationally engaging. Unexpectedly, many user testing comments were directed toward the teacher tools and resources. Several users suggested incorporating a feature for educators to upload materials.

Suggestions for areas of improvement pertained mainly to the usability of the game. The feedback gathered from the first user testing session was relied heavily upon to design the second version of the game demo. ForWord was continually modified throughout the process with the goal of creating the best experience. Like any web-based instructional tool, ForWord would require continual evolution.
ForWord utilizes modern, innovative technologies and interactions to guide learning within a classroom setting. It puts power in the hands of the learner and helps to create a sense of self-efficacy by allowing users to build and share their own educational material. ForWord builds upon the concept of sharing, which is at the very core of social media platforms, and incorporates this into education to add a level of community and collaboration. This creates an environment that fosters communication and growth over time. The project is designed in a smart and engaging way, placing importance not only on the material but also on the presentation and user experience.

Ultimately, ForWord is just the starting point of a larger undertaking. The concept has the potential for growth and expansion to other target audiences. On a smaller scale, future work could entail further development of each feature of the application, with emphasis on the community elements such as group creation. The incorporation of messaging and video would foster conversational activities and practice.

An educator’s version of the tool could be designed as well, demonstrating how ForWord would work from a teacher’s perspective and how it could fully integrate into a classroom. Some additional features include the ability to upload and share documents and teaching materials. Furthermore, educators could have access to forums, discussion boards, or language-specific training tools. A mobile strategy for ForWord would be a necessity. Additionally, to further increase its relevance in the educational sphere, this tool could utilize analytics and data mining to gather student data and consequently improve instruction. Emerging and innovative technologies, such as computer vision and augmented reality, could be harnessed in the learning process by allowing for the identification of objects in the real world.

From a personal standpoint, ForWord offered insight into the process of creating a complex web application. The extensive research and iterative problem solving that went into this project provided invaluable knowledge about instructional design and user experience design as a whole. Incorporating a variety of deliverables into the project scope helped to strengthen my skills in these areas.
ForWord has given me a deeper understanding of design, language, and instruction. As someone who has personally strived to learn Spanish over the course of my educational career, learning a foreign language is no small feat, but it is most certainly a worthwhile one. Design has the power to ignite change, and it is through smart design that language learning can be made more efficient, more relevant, and more engaging. ForWord illustrates the potential that is created by the fusion of design and learning.
Appendices

Appendix A. Original Thesis Proposal
Appendix B. User Survey 1 with Results
Appendix C. User Survey 2
Appendix A: Original Thesis Proposal

ForWord:

a study of an interactive learning environment in foreign language

Thesis Proposal for
Masters of Fine Arts Degree

Rochester Institute of Technology
CIAS Visual Communication Design

Christina Curtis
Thesis Proposal for the Masters of Fine Arts Degree

Christina Curtis
Rochester Institute of Technology
School of Design
MFA Visual Communication Design

Title
ForWord: a study of an interactive learning environment in foreign language

Submitted by
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5 May 2014

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Abstract

**Keywords**
interactive learning, collaborative learning, shared learning, secondary education, language, ESL, EEL, Spanish, social network

Today, children of immigrants are the fastest growing student population in the United States, necessitating a strong approach in education for English learners. Technology can be used to foster student collaboration and shared learning experiences, thereby increasing learner interest, motivation and learning outcomes. This project aims to use interaction design via new technologies in foreign language education.
Problem Statement

Education in the United States has transformed drastically over the past fifty years and is continually changing today. As we grow as a nation and as part of an increasingly connected international network, our educational system must reform to match the needs and best interests of both the population and the surrounding world.

Today, children of immigrants are the fastest growing student population in the United States. Students that learn English as a second language represent 10.6 percent of the K-12 public school enrollment, with the fastest increasing numbers in grades 7 through 12, and about 79 percent of these students speak Spanish as their first language (Calderon, Slavin, and Sanchez 2011).

The importance of language learning in schools is undeniable. With constant advances in technology, there are a multitude of new possibilities in the field of education. In recent years, there has been the emergence of new technological devices that are utilized in education, such as smart boards, touch tables, and iPads. The role of digital technology in the classroom has been proven to be valuable for both learning outcomes and student motivation (Dhir, Gahwaji, and Nyman 2013).

The idea of “sharing” has become a part of our daily lives, and especially for children of the tech savvy Generation Z. Social media outlets and applications promote the sharing and subsequent peer approval of information, images, and videos, both personal and popular. Social media in the classroom remains relatively unexplored; an untapped resource.

For this thesis project, I will use interaction design to increase learner motivation and progress in foreign language education. An internet based social networking environment will be designed for Spanish and English learners ages 11 to 14. The project will focus on student-created content to utilize relevant, real-world material in the learning process. Students will engage in peer feedback and group activities in order to foster collaboration and shared learning experiences. This online network will build a sense of community as well as cultural awareness.
Survey of Literature

Design

Designing for children
This book provides good insight about how to design for young audiences. The authors look at hundreds of case studies to address important criteria and considerations in designing for children.

Design for kids
This book addresses designing for children and their parents from both a design and a marketing perspective. They divide the book into a number of age groups, covering ages 0-12 and discussing a number of important factors that designers should take into account.

Usability Issues in Designing for Kids
This article covers important findings from the Nielsen Norman Group’s 259-page report on usability for Children ages 3-12. It points out some important findings, covering information ranging from their goals to physical limitations and guidelines for font size.
User Interface

**Designing mobile interfaces**

This book provides principles for designing user interfaces as well as some common patterns for interaction design on a number of different devices.

**Mobile design pattern gallery**

This book acts as a user interface reference and has 70 mobile app design patterns using real examples from current apps on various devices.

**Designing for User Engagement**

This book focuses on the design process for user experience and engagement, going beyond the technical to give information about aesthetics and creating fun, engaging interfaces which will be especially important when designing for children.

**User Interface Design Rules**

This book discusses best user interface practices from a cognitive psychology perspective. It gives information on the reason behind specific design choices and how and when to apply certain rules.
Subject Matter

Children & Teen Habits

**Digital Media Habits of Children**
This report looks at data of children and their lives with increasing exposure to digital media and technology. It examines children’s access to digital technology, how they spend their time, and their preferences. This will help to determine the extent to which an application or web-based tool would reach the intended audience.

**Teens and Content**
This report looks at teens and their relationship to content on the internet. It offers statistics about demographics and teen behavior. They also provide teen’s opinions in relation to the internet and content. This will help in understanding the behavior and thoughts of the target audience.

**Teens and Social Media**
This report examines teenagers and their use of social media, specifically focusing on the conversational nature of online media. They report statistics regarding social networking, blogging, image and video-sharing, etc. This will help to provide a basis for the design of an educational tool that incorporates social media.
The Role of the iPad
This study reviews the benefits of using an iPad in an educational setting. They review a vast body of research to draw conclusions about the impact of interactive technology on learning and address common misconceptions. They also discuss the issues and challenges of this type of technology.

How Teachers Are Using Technology
Purcell, Kristen et al., How Teachers Are Using Technology at Home and in Their Classrooms (Washington, D.C.: The PEW Internet and American Life Project, 2013).
This report presents statistics about digital technology and its place in the classroom, discussing both the pros and cons from the perspective of teachers.

Tablets and Early Childhood Education
This article discusses the tablet and its viability for education, specifically in motivating young children to draw. They note differences in success related to age and also in how the technology was implemented by the teacher.

Motivation through Technology-supported Learning
This thesis presents the results of a study involving middle school aged children and the effect of technology-supported learning environments on motivation. Teachers implemented a different technologies including computers, iPods, iPads, and interactive whiteboards. Results indicated that the incorporation of technology increased motivation and engagement.
Apps for Learning
This book provides case studies for 40 successful iPad applications for high school education. In addition to an informative summary, they also discuss each app’s place in the classroom and benefits to education.

Tables and Informal Language Learning
This article focuses on mobile-assisted language learning. They investigated how students use tablets to learn English in settings outside of the classroom, finding that mobile devices are ideal in creating interactive and collaborative environments for learning a language. Students also gave positive feedback regarding the usability of these devices for learning tasks.

Cooperative Language Learning
This article discusses the benefits of cooperative language learning in foreign language education. The author reviews relevant literature and compares traditional learning with cooperative learning.

Digital Storytelling in Foreign Language Teaching
This study focuses on using digital storytelling as an educational tool for students learning English as a second language. They find that it has successful outcomes and that it generates student interest and attention. Their approach focuses on student involvement in shaping their educational process, student collaboration, as well as using teaching language that is actually useful and relevant socially.
Effective Instruction for English Learners
This research review summarizes elements of effective instruction and successful program models in teaching English learners. The fastest-growing student population in the U.S. is children of immigrants. They discuss language and literacy instruction, and cooperative learning. This article gives a historical background and suggests a direction for the future.

Mobile Devices in Informal Language Education
Rahman, Mizanoor and Panda, Santosh. “Teaching English Through Open Non-formal Education in Bangladesh with an Effective Integration of ICT to Support Learning;” Turkish Online Journal of Distance Education 13, no. 3 (July 2012).
This article discusses a program called “English in Action” which is a 9 year long funded project which aims to bring a change in English Language learning in Bangladesh. It provided English language lessons to people via their mobile phones and shows the relevance of using an ubiquitous ICT device for language learning, in terms of convenience as well as equity and reaching the widest audience.

Cognitive Psychology
This textbook discusses core concepts in cognitive psychology, including cross-cultural perspectives. There is a lot of information that relates to learning and one chapter specifically covers language.

Educational Data Mining
Calders, Toon and Pechenizkiy, Mykola. “Introduction to The Special Section on Educational Data Mining,” SIGKDD Explorations 13, no. 2 (May 2012).
This article gives a brief overview of Educational Data Mining (EDM) as an emerging multidisciplinary research area and discusses four selected papers that show different application areas for data mining in education. This will be a good starting point to learn about EDM and its relevance to my project.
Sakai
sakaiproject.org
Sakai is a popular online global community that is currently creating technology that enhances teaching, learning and research. It provides open source software that offers various educational tools. Its usage by real students ultimately contributes to a large database of information.

LearnLab
learnlab.org
LearnLab is a Science of Learning Center formally known as the Pittsburgh Science of Learning Center. It uses cognitive theory and computational modeling to identify the instructional conditions that create strong student learning. The researchers conduct in vivo experiments in math, science, and language courses. They also utilize their open data repository DataShop, which allows for collaborative primary and secondary analysis of learning data.
Technology

HTML & CSS

**HTML5: Designing rich internet applications**
This book is a good reference for information and demos on HTML5, specifically its interactive and multimedia capabilities.

**w3schools.com**
This website offers an expansive and up-to-date library of information about HTML and CSS. It is a great, quick way to find an answer or learn new things.

**Foundations of UX: Prototyping**
This tutorial offers information about a number of prototyping options to help the viewer find the right solution for their design. It covers the basic concepts and goals of a prototype as well as some tools and resources to actually create one.

**Create an iPad Web App**
This tutorial demonstrates how to create a Web App that will function successfully on both a desktop and a tablet using HTML5, CSS3, and jQuery. This offers a great solution to creating a prototype without having to dig deep into the development end of the process.

**Creating an App Walkthrough in After Effects**
This tutorial presents an overview of how to create a proof of concept for an application using motion graphics.
HTML5 Drag and Drop

*Drag and Drop, @rem, in the html5demos library, accessed September 12, 2013, http://html5demos.com/drag#.*

This demo shows how to use the native HTML5 drag and drop, which is one type of interactivity I would find useful in demonstrating the actual function of my design.

Axure

[www.axure.com](http://www.axure.com)

This tool enables you to make interactive HTML prototypes of websites and applications. It allows you to design and sketch right within the program. You can incorporate dynamic content, animations, drag and drop, and calculations. This would be a good tool for my project because it would allow for relatively quick and straightforward user testing.

Stand In

[www.standin.io](http://www.standin.io)

This tool allows you to create prototypes from Photoshop in real time. It offers interactivity with button states, live text that users can edit, etc. You may also incorporate motion via transitions and animations. The drawback is that it is currently in private beta, and I am waiting for access.
Design Ideation

Typography

Fun type with some kind of handmade element that will be paired with a sans serif web font.

Figure 1. Bubu Coloring Book Logo.

Figure 2. Five Kids Branding.

Figure 3. Next Liberty Graz Magazine.
Visual Style

Clean, fun, inviting, and youthful with subtle textures, organic forms, and combo of photo and illustration

Figure 4. Property Management Website

Figure 5. Physics Textbook

Figure 6. Google Global Impact Website

Figure 7. Book Cover in Paper
UI Influences

Minimal, user-friendly, engaging, incorporation of profile, icons, emphasis on display of content

Figure 8. Duolingo App

Figure 9. AgenceMe Website

Figure 10. Eduapp Profile Page
Concept

User Flowchart
Promo Website Wireframe

The Problem

The Process

The Solution

Check it out

Document

Blog

Game Demos

Footer
## Game Concept 1

### Tag match

Drag and drop the words where they belong in the picture.

---

Utilizes user uploaded content as well as user created tags. Could use words or sentences. May involve a timer.
Game Concept 2

Story Build

1 Laura espera en el aeropuerto en frente de un avión.
2 Hay muchas personas en el aeropuerto hoy.
3 Las casas son muy pequeñas de la venta del avión.
4 Laura tiene un cuarto amarillo en el hotel.
5 Ella bebe jugo de mango en el restaurante.
6 Laura encuentra muchas conchas en la playa.
7 Ella le gusta caminar por la playa.

Select and drag the photos in order of the story above.

Utilizes user uploaded content as well as user created tags.
May involve a timer.
Game Concept 3

Photo Puzzle

Utilizes user uploaded content.
One user creates the puzzle and the second user must ask questions to figure out where the pieces go.
Stimulates conversation and the use of various vocabulary words.
Deliverables

Promotional Website
I will design and build a single-page website in HTML5 and CSS3 to give information about the project and to provide access to the prototypes, game demos, thesis blog, and process.

Website Prototype
I will use Axure to build a prototype of ForWord to show the design in a web environment and demonstrate the user interface. This prototype will be utilized in user testing. All assets will be created using Adobe Photoshop and Adobe Illustrator.

Game Demos
I will create a couple of the single player games using HTML5, CSS3, and JavaScript. These games will involve matching images and words through drag and drop interactivity. I may include tooltips to give the user help or to offer more information if needed.

Motion Graphics Prototype / Promo Video
I will use After Effects to create a promotional video and prototype of ForWord. This video will give an overview of the main highlights of the project and will demonstrate the collaborative elements of the project. I will create shorter clips of the product being used and give background information about the purpose and goals of the project. Assets will be created using Adobe Photoshop and Adobe Illustrator.
Methodology / Implementation

The target audience for this project is English and Spanish learners from ages 11 to 14, but it will be relevant as an introductory language resource for anyone. These users would be students in the process of learning beginner level Spanish or English. The educational tool will take the form of an interactive and collaborative web environment. For the scope of this particular project, demonstrations will focus on vocabulary building. I might explore the possibility of utilizing educational data mining information to aid in the design of the content and UI structure.

The project will have three main design components: user interface, interaction, and motion graphics.

**User Interface**
I will design a web-based educational tool that will consist of several different pages. This will include flowcharts, wireframes, and the development of visual style via Adobe Illustrator and Adobe Photoshop. It will be tailored for desktop, tablet, and mobile use. The design will use the structure of a social media site in that it would allow for the creation and exchange of content. Each member would have their own profile and would be able to interact with other members. Content would be published and shared across this platform, forming the elements of educational games and lessons.

**Interaction**
This educational tool would allow for interaction and collaboration between members. Interactivity would also be present within the lessons and games available on the website. Such games would include flash cards, grouping imagery, creating drawings and visuals, developing short narratives, finishing incomplete narratives, etc. Interactions might include sorting, drag and drop, CSS3 transforms, tool tips, forms, etc. I will use HTML5, CSS3, JavaScript and jQuery to demonstrate a select group of these interactions.

**Motion Graphics**
I will utilize motion graphics to demonstrate any interactive or user experience aspects of the website that I cannot create with my design or development knowledge. This will take the form of a promotional video created in Adobe After Effects, which I would like to include on a website dedicated to my thesis project.
Evaluation

Professionals in Foreign Language Education
I plan to speak with higher education Spanish professors as well as middle school Spanish teachers to gather information about successful teaching strategies and educational materials. At various stages, I will present them with my design and gather feedback on content, visual style, and usability. Surveys and questionnaires will be used.

Target Audience
It is also imperative to collect user feedback from children within my target audience. I will plan a trip to a classroom to present children with my project and gather input on the visual design, language, and usability. Axure would be used to develop a simple prototype of the website and its layout. I will observe the children's process of navigation through the website to document their actions and any errors or confusion. Questions will be verbally presented to the children. I will aim to work one-on-one with these participants to get the most feedback. In the later stages of my project, I will have the children test my interactive demonstrations in a similar manner.
Dissemination

To promote my thesis project, I will post content on a personal blog, as well as on design community websites such as vimeo, dribbble, and hunnie to get both traffic and feedback. I may also submit my project to various design competitions such as:

- The 2014 RAF ADDY Awards
- HOW Interactive Design Awards
- AIGA (Re)design Awards
- AIGA Design Ignites Change Fellowship
- Art Directors Club Annual Awards
- Communication Arts Interactive Competition
- Adobe Design Achievement Awards

Promotional Considerations

Promotion
Cost for posters and thesis displays $50
Competition Entrance Fees $300

Purchasing Domains
Promotional Website $20
Demonstration Website $20

Project Assets
Product Mockup Files (iPad, iPhone, desktop) $20
Stock Imagery $50
# Project Timeline

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- **Proposed Defense**: October 21, 2013
- **Thesis Defense**: May 5, 2014
- **1st Meeting**: October xx, 2013
- **2nd Meeting**: October xx, 2013
- **3rd Meeting**: October xx, 2013
- **Thesis Show**: May 23, 2014
- **Graduation**: May 24, 2014
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AgenceMe. accessed October 11, 2013, agence-me.com.


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Torres, Agustín Reyes, Ponce, Eva Pich, and Dolores García Pastor, “Digital Storytelling as a Pedagogical Tool within a Didactic Sequence in Foreign Language Teaching,” *Digital Education Review,* no. 22 (December 2012).


www.axure.com

www.learnlab.org

www.sakaiproject.org

www.standin.io

### Appendix B: User Survey 1 With Results

**Design**
- Composition, layout, typography?
  - Player 1
  - Player 2
  - Player 3
  - Player 4
  - Player 5
  - Player 6
  - Player 7
  - Player 8
  - Player 9
  - Player 10
  - Player 11
  - Player 12
  - Player 13
  - Player 14
  - Player 15
  - Player 16

**Graphics**
- Consistent visual style, artwork quality?
  - Player 1
  - Player 2
  - Player 3
  - Player 4
  - Player 5
  - Player 6
  - Player 7
  - Player 8
  - Player 9
  - Player 10
  - Player 11
  - Player 12
  - Player 13
  - Player 14
  - Player 15
  - Player 16

5 = strength / 3 = minor revisions / 1 = needs improvement

[Image of survey results]
**Technical**

| Functionality, game play, have a play and replay option? |
|------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|
| Levels?                                               | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 1                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 2                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 3                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 4                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 5                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 6                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 7                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 8                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 9                                              | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 10                                             | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 11                                             | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 12                                             | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 13                                             | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 14                                             | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 15                                             | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Player 16                                             | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |

**Comments:** write down your thoughts about the game.

- Plants were kind of hard to see but love it otherwise.
- It works turn red even when I drop them within the white area.
- Some names are difficult to relate to the food.
- No offense but I don't know these names... we they English? The click and drag works ok, and the leaderboard is good.

Tags got lost, I had no idea they were there at first. Annoying layout design.

Tags not visible prominently.

At first time, I didn't see the tag. They're not obvious enough.
### Appendix C: User Survey 2

#### Demographics
- Age
- Gender
- Education Level
- Spanish Experience Level

#### The Website (Prototype)
- **How easy is it to use the website?**
  - 1 easy
  - 2
  - 3
  - 4
  - 5 hard
- **How motivated would you be to use this website to learn?**
  - 1 not at all
  - 2
  - 3
  - 4
  - 5 very
- **How would you rate the look and feel of the website?**
  - 1 poor
  - 2
  - 3
  - 4
  - 5 excellent

#### The Game
- **How easy is it to play the game?**
  - 1 easy
  - 2
  - 3
  - 4
  - 5 hard
- **How motivated would you be to use a game like this to learn in class?**
  - 1 not at all
  - 2
  - 3
  - 4
  - 5 very
- **How would you rate the look and feel of the game?**
  - 1 poor
  - 2
  - 3
  - 4
  - 5 excellent

#### Do images and other kinds of visual media help you to learn new things?
- 1 not at all
- 2
- 3
- 4
- 5 very much

#### Does working with others motivate you to learn?
- 1 not at all
- 2
- 3
- 4
- 5 very much

#### Comments and Feedback

Thanks!

*a short survey about the project*
Photography Credits

Stock photography was purchased from Stocksy United for some of the photographic images that appear within the various User Interface designs of this thesis project. Credit and gratitude is given to the following list of photographers.

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