Vocabul-AR-y: Action Research Project of Aurasma to Support Vocabulary

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Abstract: English Language Learners or ELL students are those students who either speak a different language or have a foreign language as their primary language spoken in their home. They often struggle with learning and remembering new vocabulary because of the language barrier. New technology and interactive apps can help with understanding and retention for these students. The purpose of this action research project is to evaluate the use of Aurasma to increase student engagement and retention of vocabulary of a unit on technology and how it changed society for second grade ELL students at an elementary school on Oahu. Students engaged in a three week technology unit, which included interactions with the Aurasma app. The students had the opportunity to view Aurasma video clips and images that were overlaid onto their science textbooks and vocabulary flash cards, previously made by me. They also created their own video clips using Adobe Voice to use as Aurasma overlays using an iPad. At the end of the project, they got to view and share their Auras with each other. This project was important for showing how augmented reality can affect understanding and engagement with students.

Introduction

Working with English Language Learning (ELL) students provides a teacher with new challenges everyday in all the subject areas. According to Diane Ravitch, in her book *EdSpeak: A Glossary of Education Terms, Phrases, Buzzwords, and Jargon*, ELL students are "students whose home language is not English and who has not yet acquired proficiency in English" (2007). One of the most difficult barriers for ELL students to overcome is the acquisition of English vocabulary and ability to retain new words and concepts they learn. In their general education classrooms, they spend a lot of time learning and reviewing vocabulary using traditional methods, such as flashcards and writing definitions.

As an ELL teacher, it is a challenge to find ways that are engaging and interactive for students to learn and retain new vocabulary. I found that students often tell me that reading and writing are boring. Throughout the school day they read from textbooks and do worksheets, which don't engage them and aren't as interactive as their games and toys.

One problem that I wanted to address was the lack of engagement and interest my students have in learning.

From my experience, I also found that my students have a hard time understanding the definitions in their textbooks that don't give images and examples. Since there is a language barrier, I often find it easier to show them pictures on the computer when they don't know what something is. I also noticed students have difficulty determining the context in which to use vocabulary. The second problem I want to address is vocabulary and content retention by using images to increase their memory of vocabulary words.

These two problems can be addressed by using new technology and interactive tablet-based activities. The purpose of this action research project is to evaluate the use of Aurasma to increase student engagement and retention of vocabulary of a unit on technology and how it changed society for second grade ELL students at an elementary school on Oahu. I want to use Aurasma, which has visual, audio, and interactive components, to see if it will allow for greater engagement of students and retention that goes beyond rote memorization.

Literature Review

Technology

In recent years, technology has become an integral part of education and it is important to start integrating technology to engage students and enhance their learning experience. The International Society for Technology in Education (ISTE) has created a set of technology standards for students and teachers, discussing how technology should be integrated into lessons and student work production. The ISTE website states that our goal as educators is to prepare our students for the future by teaching the technology skills and knowledge they will need in a global and digital society (ISTE, 2007).

Before students can really understand technology and how to use it, they must learn about what it is and how it continually changes. The unit addresses the HCPS III science standard SC 2.2.1, which focuses on changes that have occurred in society as a result of new technology.   Once they understand and know what technology is, they can start using it more effectively for learning. Roessingh (2014), states that students should be using information and communication technology tools to do task based learning, which can heighten student motivation, sense of autonomy, and vocabulary development. Technology is a regular thing in our society and must be incorporated into learning. If teachers can begin to include technology in the tasks given to students, they can create more meaningful experiences for students (Roessingh, 2014).

Augmented Reality

Augmented Reality (AR) is a recent technology trend, which can be used in education to support ELL students in overcoming the language barriers and challenges. According to

Wu, Lee, Chang, and Liang, of Graduate Institutes of Science Education in Taiwan, AR is the "coexistence of virtual objects and real environments," which allows learners to see and visualize the real world in a different way. Students interact with a mix of two- and three-dimensional objects overlaid onto a target image or background in the real world (Wu et. al, 2013). Augmented Reality is most common on mobile phones and tablets. One widely used AR app used in education, entertainment, and retail is Aurasma. This app allows for the user to layer an image, video, or 3D object on top of the physical world by using a trigger or real-world image. Apps like Aurasma involve sounds, visuals, and tactile interaction, creating a more meaningful experience for students (Wu et. al, 2013).

There are a variety of ways to use Aurasma in the classroom. Erin Klein (2013) a classroom teacher and instructional coach has used Aurasma in her classroom and gives many great ideas on her blog, Kleinspiration. She shares that Aurasma can be used to support and enhance vocabulary, sight words, reading, bulletin boards, and more. She shared how vocabulary words can be made into augmented reality flashcards and students can have a way to interact with the otherwise boring flashcards. She also shares how students can create their own Auras and share them with each other (Klein, 2013). Students learn from peers and collaboration, so if we allow them to create and view their peers' work gives them more interaction and experience working with others.

Theory and Augmented Reality

Using AR with students builds on the constructivism theory, which encourages students to work collaboratively and take learning into their own hands. AR also relates to other theories like situated learning theory, self determination theory (SDT), and flow theory. Situated learning is when learning occurs naturally during activities. AR will create experiences and opportunities that allow natural learning. Self-determination theory says learning occurs through motivation. Using AR and the iPad is interesting and fun for students, which can motivate them to engage more with the learning activities. Finally, flow theory describes how people who are doing meaningful activities are more likely to be focused. AR and the projects that can be created using iPads can be meaningful to students because it is something they love working with. The meaningful experience can increase their focus on the topic, thus increasing their retention and learning (Antonioli, Blake, & Sparks, 2014).

Current Research Studies

Augmented reality incorporates audio and visual learning. ELL students need visual learning to reinforce the new vocabulary and it helps their understanding of the words. Oe and Alam (2013) did a study on picture-based e-learning of phrasal verbs. They found that both groups did better in writing example sentences after practicing with pictures rather than just words (Oe & Alam, 2013). My study incorporates images, video, and audio, which according to the study will improve their learning more than if they were just reading definitions. Studies have shown that AR leads to an increase of on-task behaviors.

Di Serio, Ibáñez, and Kloos (2013) did a study to show AR had a positive effect on student motivation. They found there was a lot of enthusiasm for using AR and could be a great motivational tool (Di Serio, Ibáñez, & Kloos, 2013). My study hopes to prove the same idea, that AR can foster better attention and satisfaction in learning. More attention and satisfaction will mean they are looking at the material more and are excited about it, which in theory will increase their learning.

Finally, Perez-Lopez and Contero did a study on augmented reality to deliver multimedia content to support teaching and learning. They used an AR application in the classroom, and the results showed that there was an increase in knowledge retention of students using the AR multimedia contents as opposed to traditional methods (Perez Lopez & Contero, 2013). This is a great study to base my own research off of, because it shows that AR can improve learning and knowledge retention.

Project Development

For this project, I started by identifying a locus of control, which would be my second grade students. After that, I had to identify a need that my students had, which I could address using technology. I didn't want to do an Instructional Design project, because they have difficulty being independent readers and listeners. So, I chose to do an action research project to see if I could improve an area of their learning. I finally decided on vocabulary, because I was noticing that many of my students had difficulties remembering vocabulary when there was just a word definition. I saw a need to provide more visual and audio oriented methods of teaching them, than what the textbooks were providing. I then chose to do a science unit, to be able to cover more than just reading and writing standards. Considering the time of year I would be implementing the unit, I decided on a unit focused on technology and how it has changed our society.

After deciding on a unit, I had to decide on a tool to use for this unit. I had some experience with augmented reality and working with Aurasma, and I thought that it had all the components I was looking for in a tool. Aurasma allowed for visuals and audio, but it went beyond just photographs and incorporated videos and 3D images. Once I chose a tool and a topic, I decided to design a three-week unit that incorporated, reading, writing, research, and the Aurasma component.

The auras can be found by downloading the Aurasma app on your smartphone or tablet. Once in the app, you may login with the username: AliamanuELL and the password: aesell203. Once there, click on the tab at the bottom that looks like a man. This will take you to the account and the target images for each aura. You will need the target images printed in order to scan them and use the app. (Please do not change or delete any auras.) You can find and use the target images, videos, screenshots, as well as the rest of my tools at: https://drive.google.com/open?id=0B51uUZMA5rFobWo1c21OM3FicVE

The three-week unit began with a short introductory nonfiction leveled reader called, *Schools Then and Now,* which looks at schools and how they have changed from past to

present. The pictures and text of this leveled reader had Aurasma created 3D and moving images overlaid on top, to create an interactive experience. The students then did a Venn diagram on schools in the past and present and wrote a short paper on what they learned.

The second portion of this unit was reading a leveled reader called *Technology in our World*, which discussed what technology is and shares real world examples. The majority of the vocabulary for this unit came from this book, while the other words came from the science textbook. The vocabulary list included: technology, tool, invent, transportation, communication, vaccine, satellite, computer, electricity, manufacture, machine, and materials. The students read the book and interact with the Auras overlaid on the images and text. The book had the 3D and moving images using Aurasma throughout the book. An example of the auras can be found in Figures 1, 2, 3, and 4.
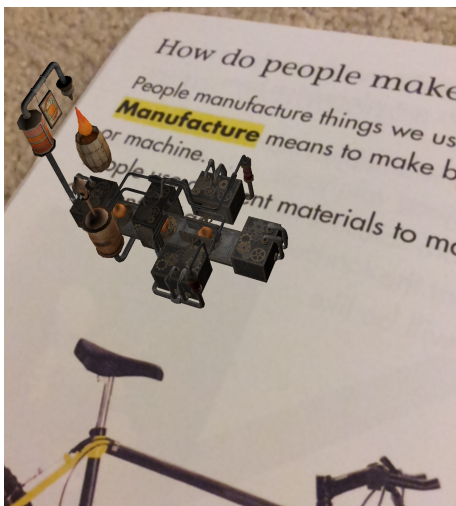
Figure 1. Aura for Manufacture

Figure 2. Aura for Satellite

Figure 3. Aura for transportation.

Figure 4. Aura for past school desks.

The vocabulary was reinforced through Aurasma created flashcards, overlaid with videos. The videos were created using Adobe Voice, and appear when the students use Aurasma to scan over them. Each video has the vocabulary word, images, the definition in text, and a short narrative by myself. Throughout the last two weeks of the unit the students had access to the word wall and used it to review at least twice a week. An example of the flashcard auras can be found in Figure 5.
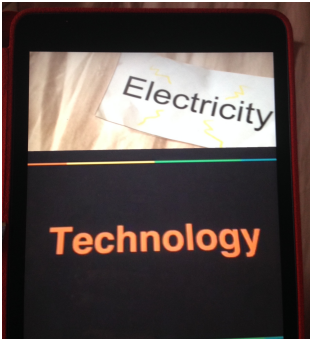
Figure 5. Flashcard auras with video overlay.

The final portion of this unit was a mini research project in which the students picked a technology and found information on how it changed society. They filled out worksheet and a timeline to guide them through the research finding process. The worksheet and timeline can be seen in Figures 6 and 7. After they completed the research, they wrote a short paper on their findings. Then they created a short video that has images of their technology and a voice over of them reading their papers. The video was overlaid onto a picture they have drawn to create an aura using Aurasma. The students shared their projects and enjoyed watching each other's auras.

Figure 6. Research Worksheet.   **Figure 7**. Technology Timeline Worksheet.

To collect information, I gave a pre- and post test, which helped determine if the students retained the vocabulary. The pre- and post test had similar questions using images and text. Since this was not a test of reading, some students had the text portions read to them. The pre- and post-test can be seen in Figures 8 and 9.
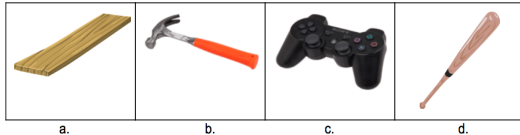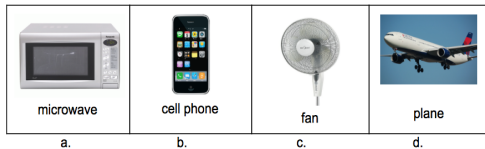
Figure 8. First page of Pre-Test
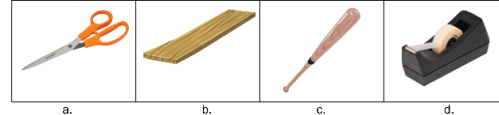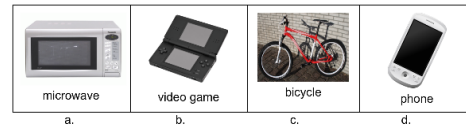
Figure 9. First page of Post-Test

I also used a pre- and post-survey to collect data on the children's experiences prior to the unit and their experience with Aurasma. Engagement was also shown by how the students felt about using the technology and going through the unit. The post survey asked questions like, if they enjoyed Aurasma and if they would like to use it again. The surveys can be found in Figures 8 and 9. To collect information on the engagement of the students, I used different observational tools. I first used an observational protocol that had a checklist of behaviors that showed engagement and non-engagement. Engaged behaviors included engaging with the iPad, smiling, asking questions, and sitting up, while non-engaged behaviors included putting their head down, yawning, or saying "I'm bored." I used a blank chart to record their names and the behaviors they displayed while working with Aurasma. The second tool were daily observation sheets, where I wrote down things the students said or did that were important. The notes helped me collect data on how engaged they were with learning. The observational tools can be found in Figure 10.

Student Pre-Survey

Name:_____   Date:_____

1. Do you use a tablet or smartphone, like an iPad or iPhone at home?

👍 Yes   👎 No

2. What do you use your tablet/phone for the most? Circle one.

Fun Games   Educational Games   Reading

Videos   Facetime/Skype   Other:_____

3. How often do you use a tablet/phone?

Never   Hardly   Sometimes   Everyday

4. Do you know what Augmented Reality is?

👍 Yes   👎 No

5. Have you ever used Augmented Reality Apps, like Aurasma or 4D?

👍 Yes   👎 No

Figure 8. Student Pre-Survey

Student Post Survey

Name: _____   Date:_____

1. How did you like using the iPad?

Not at all   Okay   Good   Great

2. How much fun did you have using Aurasma?

None   Some   A lot

3. How easy or hard was it to use Aurasma to scan?

Easy   Okay   Hard

4. How easy or hard was it to create your own Auras?

Easy   Okay   Hard

5. Would you like to use Aurasma again?

👍 Yes   👎 No

6. Would you put Aurasma on your own iPad or iPhone?

👍 Yes   👎 No

Figure 9. Student Post-Survey

Engagement Observation Tool

Date: _____   Time of Observation: _____ to _____

Time	Student Names						Teacher Actions
Total							

Engaged Behaviors:	Unengaged Behaviors:	Observations:
N1- on task: listening / watching	F1- off task: passive	
N2- on task: sitting up straight / leaning forward	F2- off task: slouching / head down	
N3- on task: asking / answering questions	F3- off task: ignoring questions, shrugging shoulders, "I don't know"	
N4- on task: concentrated on Aurasma	F4- off task: opening other apps	
N5- on task: scanning Auras	F5- off task: not using iPad	
N6- on task: hands on creation	F6- off task: not creating Auras / "I'm bored" / "This is boring"	

Figure 10. Engagement Observation Tool

Conclusion

After going through the design process and watching child behaviors, there would be some changes to the tools I made for this project. Looking at the observational tool and the pre-determined behaviors I assigned, I noticed that I was missing some key behaviors that children do. Next time, I would include additional behaviors like playing around, being distracted by other things, and reading. The tool I created did not cover the whole scope of child behaviors, and I would leave a category for "other behaviors" that I did not include in the pre-determined behaviors.

The videos and auras I created also needed improvement. I repeated some auras and overlays, because of the limitations of the Aurasma library. Next time, I would find other overlay options for pictures that appear more than once in the book. Also the videos I made for the flashcards were too long. Next time, I would cut the length of the videos and display the definition in words at the beginning of the video. I would also create a few sets of Aurasma integrated flashcards so that there was more of a variety that the students could look at. The different sets would include a definition video and a few example videos.

After looking through my unit many times, I realized that only half of the three-week unit was integrated with Aurasma. The students had the opportunity to use the AR flashcards, but the flashcards weren't used everyday. I also hope to find a way to integrate AR or other technology into the writing portions of ELL class. The video and aura creation at the end of the unit was not enough integration of technology for the writing process. The students did not go through a fully technology integrated unit, and I would hope to change that the next time I use AR in the classroom.

This action research project helped find ways to engage students and enhance the learning experiences of students receiving ELL services. It gave students an interactive way to learn vocabulary and concepts. The students had a way to see and hear definitions and examples of vocabulary, to create meaningful learning experiences by evoking different senses (Oe & Alam, 203). This action research hoped to conclude that by utilizing multiple senses and showing an augmented reality, rather than a regular text, it is more enticing and fun for children. Since there were positive reactions to Aurasma, I will try to integrate more AR experiences in my teaching.

I plan to advocate for the use of AR and technology in the general education classrooms, to integrate technology and give students interactive ways to learn. These learning opportunities will help them gain skills and practice using technology and software. Since this integration of Aurasma was successful, it will be a gateway for more meaningful integration of technology into the classroom. All students, especially ELL students can benefit from going beyond reading, and interacting with the information they are learning.

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