Using Augmented Reality to Bring the Curriculum to Life

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This work is based on an experimental proposal for a constructionist curriculum project in early childhood using augmented reality, which is an image recognition technology. The technology was selected to serve as a motivational tool and vehicle to promote student engagement. It was also developed as a means to enhance teaching and learning in the classroom. The proposal is not designed as a lesson plan, instead it was developed to bring forth new technologies which are developmentally appropriate and within the confines of early childhood.

How can using an image recognition technology be utilized with young learners? One of the ways to incorporate this type of technology is for the purposes of modeling a skill or task at one of the learning stations. A teacher and/or student can be recorded demonstrating the procedures or expectations at a particular learning center, such as how to complete a design journal. In doing so, the student will be able to view the image as many times as needed in order to gain a clearer understanding of the task at hand.

The technology can also be utilized for the purposes of recording formative and summative assessment data in a less traditional manner and as an authentic means of demonstrating and documenting student growth. For instance, a student can be provided with a pre-constructed LEGO structure to see what he/she is able to build or create.

Incorporating the use of image recognition technology will also afford the opportunity to expose students to new experiences by immersing them in instantaneous digital experiences. The curriculum can actually be brought to life in a matter of minutes. Virtual field trips can be strategically designed using augmented reality in order to bring forth real-world experiences.

LEGO LEARNING

STATION



*Figure 1-Augmented Reality using the Aurasma App*

As a proof of concept, an augmented reality activity was designed using the Aurasma App and the trigger image displayed above in Figure 1. The concept for the idea was to create a means in which students could be drawn into one of the learning stations in the classroom. In Figure 1, Aiden, a seven year old boy, introduces the LEGO Learning Station to the viewer and provides a first-hand testimonial of the benefits of visiting the LEGO Learning Station. He also shares the many creations that he has developed while working at this station.

Some of the constructivist concepts that are reflective using this technology include the understanding that children create their own learning experiences. This way of thinking is centered on Piaget’s constructivist epistemology in which he demonstrates that children construct and reconstruct reality out of their experiences with the environment (Bers, xii). In Figure 1, although the technology was originally intended to draw the viewer into the LEGO Station, it is evident that Aiden is entrenched in the world that he has created using the LEGO bricks. The bricks are no longer mere pieces of plastic; they represent a new world that has been created and recreated based on his interactions with the bricks themselves.

The tenets of constructionism can also be evidenced when incorporating the integration of augmented reality into the early childhood classroom. According to Papert, when children build their own mechanical/electronic objects, they have created an experience from which they learn new concepts of space, time, and causality (Bers, p. xii). Furthermore, Papert also believes that traditional manipulatives engage children in using their hands and developing fine motor skills, as well as hand-eye coordination. The use of these manipulatives also promotes social interactions and negotiations while playing to learn and learning to play (Bers, p.4).

While creating the augmented reality image in Figure 1, several videos of Aiden were captured that were reflective of Constructionist views. In one of the videos, Aiden and his cousin Gabriel were negotiating which items were going to be utilized on the final LEGO piece that Aiden was creating. In another video, Nickie (Aiden’s other cousin), was intrigued by the iPad being used for the recording. As a result of his fascination with the device, Nickie was handed the iPad and he created his own video of Aiden at the LEGO Learning Station. In the process, one of the skills that Nickie had to master was the hand-eye coordination in order to capture the desired image.

The use of image recognition technology has the ability to promote ‘powerful ideas’ within the early childhood classroom. Augmented reality can be reflective of a ‘powerful idea’ as long as a cultural connection is proven. In other words, if young learners develop the belief that technology is an important and relevant tool in the learning process then a cultural connection can be established. The use of AR also has the ability to tap into a child’s interests, passions and experiences by making personal connections. Furthermore, image recognition technology can also be utilized to create domain connections which are tied to diverse subjects or topics. For instance, if the students are interested in learning about sea life, they can take a virtual trip to a local aquarium in a matter of minutes.

There are numerous projects that can be designed to support student learning using augmented reality and an iPad in the early childhood classroom. Such projects can include taking a virtual trip to the [Liberty Science Center](https://www.youtube.com/watch?v=l7Q1_C9eZ5k) as part of the Science Learning Station in the classroom. They can even visit the gorilla exhibit at the [Bronx Zoo](https://www.youtube.com/watch?v=lUOjNP_APJw) as part of a thematic unit at one of the stations.

At the Literacy Learning Station students can using AR to share book reviews with their classmates. The [book reviews/book recommendations](https://www.youtube.com/watch?v=jdnlTeEqkNc) can be based on students’ interest or created according to the individual reading levels. In doing so, not only are the students learning about content, they are also actively engaged in the process. This station could also be included as part of the classroom library or at the library media center.

The use of augmented reality can also be utilized to gather artifacts for an electronic portfolio to record student progress throughout the span of the year. As in the case with Aiden, in Figure 1, it would appear that he is still tinkering in the block stage. With the assistance of an adult, the learning environment can be designed to introduce programming and robotics manipulatives to facilitate further exploration. This process can be captured using AR as a means to gather formative and summative data.

The use of this technology can also establish home/school connections. By incorporating image recognition technology into the classroom, the curriculum can be brought to life at home. Parents can be encouraged to download the designated augmented reality App on their iPhones or iPads. Once the App is downloaded, the teacher can send home a document with various images that can be triggered on their devices. Teachers have the ability to utilize this technology to welcome the parents into their classroom and introduce them to a new concept or unit of study. The trigger images can also be used to display content-related information to reinforce learning skills at home, as well as, a means to highlight student progress at school.

In order to consider the use of augmented reality in the early childhood classroom, certain practical and organizational elements need to be considered in order to ensure the successful implementation of this technology within the ecosystem of the classroom. First and foremost, a design process should be established prior to embarking on such a journey. Megina Baker, a graduate student from Tufts University adopted a model as part of a kindergarten study group that lays a solid foundation to get the process started. Baker recommends establishing project goals for the technology which are aligned to the standards. She is also a supporter of initial provocation in which planning is developed around students’ interest. Following evidence of successful initial provocation, the curriculum planning stage takes effect. Once the curriculum is planned it would be carefully implemented and the learning experiences would be extended (Bers, p.53-59)

Other factors that warrant consideration specific to the use of augmented reality include accessibility to the technology. Do the teachers and students currently have access to the devices? If not, has funding been earmarked for the purposes of this new initiative? Logistical issues would also need to be considered. Where will the devices be stored and who will maintain them? Is there a wireless internet connection in the classroom? If so, how reliable is the connection?

Once the devices have been made available, training and development will need to take place. The teachers will need to be trained on how to utilize the actual technology and further professional development will be needed to incorporate meaningful ways of infusing the technology into the curriculum. The students will also need guidance on how to use the devices along with the image recognition App. Parent training will also need to be considered in order to establish home/school connections using this technology.

References

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