The Results of Using Open Educational Resources and Virtual Reality in Higher Education

Ashley Holder
College of Education
Fayetteville State University
1200 Murchison Rd.
Fayetteville, NC 28301
(910) 672-1316
aholder@uncfsu.edu

Terrie Bethea-Hampton, NBCT
School of Education
Campbell University
PO Box 369
Buies Creek, NC 27506
(910) 893-1715
betheahampton@campbell.edu

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Abstract

Educational technology has exploded at a rapid pace, requiring educational institutions to select the most innovative techniques and platforms to complement instruction. Incorporating the latest technologies such as Open Educational Resources (OER) and Virtual Reality (VR) into curricula have proven to be beneficial in the areas of active engagement and student-centered learning. For instructors of higher education, it is not a matter of "if" the use of technology will increase in the classroom but "how." This paper discusses OER and VR and how these technology resources can be implemented into lesson design through a study conducted at two universities in North Carolina.

Introduction

Research reveals that reality platforms have already impacted the world significantly, and OER and VR being present among modern technology tools for instruction. It is imperative to note that today's learners learn best with the integration of digital technologies, and the use of OER and VR enables instructors to accommodate current learning styles (Smale and Regalado, 2018, p. 1). Additionally, "technology use in the classroom is rapidly changing how we teach, how children learn, and how school districts spend their resources" (Armstrong, 2014). The primary focus of this paper is to reveal the results from two years of study on the subjects of OER and VR at each university. Graphics are included to display survey outcomes better.

Ease and Affordability

In terms of students, affordability is one of the most significant challenges higher education institutions face today. To overcome this battle, universities are looking to adopt resources that are more affordable for college students (Colvard, Watson, & Park), thus, explaining why Open Educational Resources (OER) and Virtual Reality (VR) are receiving massive attention, as these are avenues that lower student textbook cost and provide current materials through platforms which allow the instructor to access, adapt, and distribute resources to support their course curricula (Taylor & Taylor, 2018).

OER was incorporated into READ 400 Practicum in Correction of Reading Problems course at one of the universities in the study. This course is taken by pre-service teachers earning their bachelor's degree in elementary education with a concentration in reading. Intellus, an OER popular platform, was chosen by the instructor to explore OER, which was easy to navigate and implement in the course. The OER selected from Intellus worked smoothly with Canvas (Learning Management System), as the instructor could embed the resources into course modules with ease. Also, Intellus enables instructors to produce a syllabus through their platform, which allows students to click on links that directly navigate them to the OER for that particular module. Intellus makes it easy for faculty to find, adapt, and modify high-quality resources for courses (Amman, 2018). See below for a list of selected resources used in READ 400.

Module 1 - Beliefs about Reading

- "A Diagnostic Teaching Intervention for Classroom Teachers: Helping Struggling Readers in Early Elementary School." Library (EBSCO). Academic Search Complete [a9h], 31 Oct. 2010. Article/Journal.
- "Teaching struggling readers in elementary school classrooms: A review of classroom reading programs and principles for instruction." Library (EBSCO). Academic Search Complete [a9h], 31 Jan. 1999. Article/Journal.
- "PLCs in Action: Innovative Teaching for Struggling Grade 3-5 Readers." Library (EBSCO).
- Academic Search Complete [a9h], 30 Sep. 2013. Article/Journal.
- "Get to Know Your Students" Youtube. 05 Jan. 2017. Video.

Module 2 - Reading Motivation & Early Literacy: Sessions with Client

- Dr. Andy Johnson. "Motivating Students to Read: 11 TIPS" Youtube. 28 Feb. 2014. Video.
- "Supporting English-Language Learners and Struggling Readers in Content Literacy With the "Partner Reading and Content, Too" Routine." Library (EBSCO). Academic Search Complete [a9h], 31 Mar. 2010. Article/Journal.
- "REACHING STRUGGLING READERS." Library (EBSCO). Academic Search Complete [a9h], 30 Apr. 2015. Article.

Module 3 - Reading Levels: Sessions with Client

- "Revisiting Key Assumptions of the Reading Level Framework." Library (EBSCO). Academic Search Complete [a9h], 31 Aug. 2012. Article/Journal.

Module 4 - Phonics Instruction: Sessions with Client

- Lucia Parry. "Whole Group Phonics Lesson - Parry" Youtube. 14 Feb. 2013. Video.
- Lucia Parry. "Phonics Small Group - Parry" Youtube. 14 Feb. 2013. Video.
- Mindset Teach. "Phonics" Youtube. 10 Dec. 2013. Video.

Module 5 - Vocabulary: Sessions with Client

- "Four Corners Strategy" Youtube. 23 Feb. 2017. Video.
- AmericanGraduateDC. "Explicit Vocabulary Teaching Strategies" Youtube. 30 Apr. 2012. Video.

Module 6 - Reading Comprehension: Sessions with Client

- "High 5!" Strategies to Enhance Comprehension of Expository Text." Library (EBSCO). Academic Search Complete [a9h], 31 Oct. 2010. Article/Journal.
- "Help with teaching reading comprehension: Comprehension instructional frameworks." Library (EBSCO). Academic Search Complete [a9h], 30 Apr. 2006. Article/Journal.
- Shannon Oden. "Teaching Reading Fluency and Comprehension" Youtube. 05 Jul. 2011. Video.
- "The Interactions of Vocabulary, Phonemic Awareness, Decoding, and Reading Comprehension." Library (EBSCO). Academic Search Complete [a9h], 31 Jan. 2013. Article/Journal.
- "Fluency: Bridge between decoding and reading comprehension." Library (EBSCO). Academic Search Complete [a9h], 28 Feb. 2005. Article/Journal.

Intellus helps instructors access high-quality resources quickly through the "explore" database. The search capability allows faculty to narrow the search to precisely the type of resource they wish to embed in their curricula. For example, instructors have the choice to choose date of publication, source (EBSCO, Pearson, Youtube, TED talk, videolectures.net, wisc-online, article, etc.) and type (article/journal, assignment, case study, assessment, audio, data, eBook, flash cards, exam, games, interactive tutorial, lecture notes, lesson plans, podcast, video, webpage, etc.). Making the transition to incorporate OER in a course is a bit challenging. When embedding OER. faculty have to know how to evaluate information for quality and relevance, as there are so many open resources available (Pierce, 2016). Therefore, this takes a lot of preparation when redesigning a course. However, after seeing how Intellus impacted student engagement and learning in READ 400, the extra planning was undoubtedly worth the time.

OER Ease of Use for Students

During this project implementation, students were able to navigate through the OER effortlessly. One barrier that students encountered is that they must have Internet connectivity to explore the OER fully (Olufunke & Adegun, 2014). Since most universities have a library and free WiFi for students, the benefits of OER outweigh this challenge. Additionally, most universities are near restaurants that offer free WiFi services to students.

In a survey distributed to students in READ 400, 100% of the participants rated Intellus to be easy or moderately easy to use. See Figure 1

Was Intellus/OER easy to use? Would you describe it as easy, moderately easy, difficult, or very difficult?
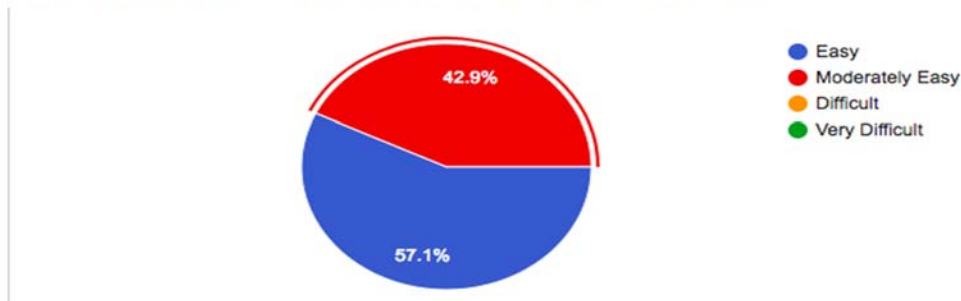

- Easy
- Moderately Easy
- Difficult
- Very Difficult

42.9%

57.1%

Figure 1. Screenshot of Survey Data

OER Impact on Student Learning and Engagement

Intellus had a positive impact on student learning and engagement in READ 400. OER provided multiple avenues for students to express themselves, as they could interact, communicate, and respond to class assignments. Findings have revealed that the use of OER increases student motivation as resources are relevant and of interest to the learner (Sulisworo, Sulistyo, & Akhsan, 2017).

In a survey distributed to READ 400 students, 100% of participants felt that Intellus made a positive difference in their learning and engagement (see Figure 2). Additionally, students were asked to provide examples of ways the resources enhanced or did not enhance knowledge. One student stated, "I was able to engage with other students as well as Dr. Holder very easily." Another student mentioned, "I especially liked the videos, I am a visual/demonstration learner, so the videos were a great help." Moreover, students commented on the resources in Intellus stating, "Intellus provided excellent materials for the course."

Did Intellus/OER make a positive difference on your learning and engagement?
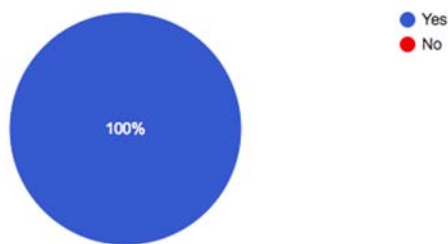

- Yes
- No

100%

Figure 2. Screenshot of Survey Data

It is also important to note that based on survey results for READ 400, 100% of participants revealed that they would like to use Intellus in future college courses. See Figure 3

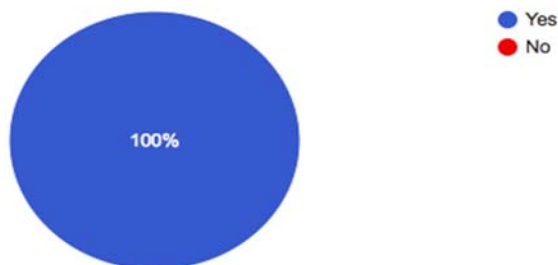**Would you like to use Intellus/OER in future college courses?**

Figure 3. Screenshot of Survey Data

How does OER Compare to the Traditional Textbook?

Just like the traditional textbook, OER has the potential to enhance student achievement. In a study conducted by Ikahihifo, Spring, Rosecrans, and Watson (2017), college students rated OER to be just as or even more engaging than traditional texts.

It is estimated that the average student spends over $1000 per year on textbooks alone. OER reduces school costs for students, which removes the barrier between the student and their career pathway. Educators have found that university students appreciate the value in OER, as some students do not have additional funds beyond their scholarships and work-study awards (Lashley, Cummings-Sauls, Bennett, & Lindshield, 2017).

In a study conducted by Vojtech, Gabrielle, Grissett, and Judy (2017), college students expressed that they would instead use OER in place of the traditional text due to the creativity of the course. In the same study, students reiterated that the cost was indeed a benefit as they were not expected to purchase a text when using OER. It is important to note that in a study conducted at eight colleges across the United States, researchers found that both teachers and students rated OER to be at least equal in quality to traditional texts (Bliss, Robinson, Hilton, Wiley, 2013).

Based on survey results distributed to READ 400 students during data collection, 71% expressed that they would prefer using Intellus over the traditional text. See Figure 4

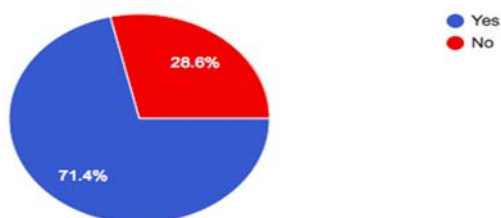**Do you prefer using Intellus/OER over the traditional text?**

Figure 4. Screenshot of Survey Data

Students were also asked to compare the quality of OER provided through Intellus and those offered through their regular textbook. One student quoted, "I am more traditional; however, both worked effectively." Another shared, "I like a textbook in my hands; however, I did like articles and videos provided through OER." "Personally, I would like both items when taking a course." Another student commented, "Both sources offer the same information, I carry my phone everywhere, but textbooks sometimes get forgotten." Lastly, "My professor made learning easy with the OER, and I learned more with the combination of the learning material and my professor than just using the textbook."

VR in the Classroom

Each year students enrolled in EDUC 455 Foundations of Technology for Educators course experience the use of VR in the classroom. Students taking the course are K-12 teacher candidates seeking teacher licensure. The course is taught face-to-face and online. Students in the face-to-face class work with the 52 cardboard VR sets available in the classroom and students in the online version of the class conduct research, read articles, and watch videos on the use of VR in the classroom. Online students are also encouraged to purchase a low-cost VR cardboard set. Students are intrigued and highly motivated to participate in activities associated with VR or to conduct research on the subject. Through the sharing of VR research and experiences with fellow higher education instructors, all have provided similar feedback stating that VR is a fun and exciting way to introduce new concepts, content, and materials.

The Role of Virtual Reality in Education

Completing courses requiring the use of technology as a resource is a norm for students enrolled in learning institutions globally. Many assume that VR is only used for entertainment purposes, such as gaming, movies, and even reading novels. However, VR is much more than entertainment and serves as a resource for medicine, science, training, and education. VR relates to education and the potential benefits available to students. Barbara L. Ludlow, chair of the department of special education at West Virginia University shares that virtual environments should be included in schools and higher education institutions. "VR is an emerging technology that has resulted in a rapid expansion in the development of immersive virtual environments for use as educational simulations in schools, colleges, and universities (Ludlow, 2015)." VR is a technology that projects images of the environment to appear real. New studies indicate that applying VR devices in the classroom has likely outcomes resulting in more effective learning environments. VR allows students to learn in settings that look and feel real.
VR technology can assist traditional students as well as students with learning disabilities by giving them an alternate learning style helping them learn more effectively through social reasoning and judgment. VR devices are an alternative to traditional teaching by providing new experiences, including virtual field trips, lectures, unique activities, and laboratory experiments. The primary question posed to educators is if this technology should be embedded in the curriculum and how VR devices can be used to transform the education system.

VR Impact on Student Learning and Engagement

Since EDUC 455 is a class designed for candidates planning on becoming elementary, middle, secondary, or K-12 public school teachers, during the course students participated in a practicum. The course familiarizes candidates with strategies that focus on the integration of technology into their work as teachers. Activities concentrate on candidate integration of technology in communications and infusion of technology in the learning process, differentiation, assessment strategies, and the potential inclusion of emerging technology in the classroom. Candidates enrolled in the class demonstrate an understanding of the capabilities and limitations of technology with an emphasis on student engagement and its use in education as well as its impact on society. The focus of the PowerPoint and VR activity was to measure teacher candidate engagement and to promote differentiation. Students participated in activities that were directly related to comparing the use of PowerPoint and VR. Students were also able to use Google search as an alternative in the lesson as well.

The following results are from data collected 2016-2018. Students participated in in-class activities that compared the use of PowerPoint presentations with the same content presented through VR. For this survey, students were given an in-class assignment to research many places on the Internet. In advance, a Webquest was created by the instructor that contained research on PowerPoints that highlighted the locations in the activity. Students could access the PPT Webquest via Google Classroom. The study included cities, countries, and places that rural students may or may not have the opportunity to visit in person. Students were required to locate major monuments, parks, and popular sites. Included in the list were Tokyo, China, Paris, and New York City. The students received a handout with the following instructions: 1) Use the PPT Webquest to visit the following locations. 2) After visiting the sites from the PPT Webquest - Search independently for the same places if you feel you need additional information to answer the questions 3) Write a paragraph on your findings and include at least 3 facts and finally 4) Share your experience with the person to the right of you.

Sample questions included in the activity are as follows: What does the Skytree tell you about the culture of the city of Tokyo? What is important in US history about Tiananmen Square, Beijing, and What are some interesting facts about the Eiffel Tower, Paris? This assignment was given to EDUC 455 classes over four semesters. Upon completing this in-class activity, students were then asked to complete a Likert Scale survey ranging from "Very Engaged to Not Engaged." In Figure 5, students rated their level of engagement using PowerPoint: <6% Very Engaged, 22.7% Engaged, 36.4% Moderately Engage, and 36.4% Not Very Engaged. In Figure 6, students rated their level of engagement using VR: 77.3% Very Engaged, 18.2% Engaged, and 5% Moderately Engaged. In Figure 7 students were asked if they would rather include PPT or VR in the same type lesson or if they would instead use Google on their own without the Webquest: 95.5% of students choose VR. Finally, in Figure 8 students shared in a discussion about the differences in activities using PPT and VR: 1) VR is more engaging 2) Looking up the PPT was tedious and boring 3) VR was much more exciting because I could see the places. The PowerPoints gave me more information than experience 4) VR was more fun and involved, and 5) The VR allowed us to see more about the cities and places we visited instead of just a picture of the actual thing. According to the results of this study, students overwhelmingly preferred VR over PPT activities. Additionally, teacher candidates enrolled in practicum and student teaching viewed VR as more engaging.

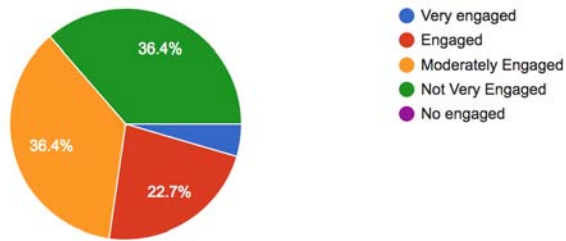*Figure 5.* Students rate their level of engagement using PowerPoint.

Figure 6. Students were asked how they rated the level of engagement using VR.
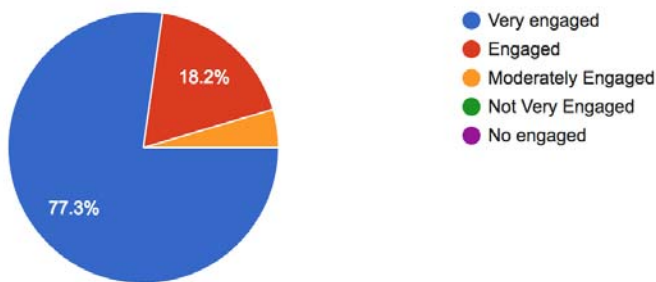

Figure 7. Students were asked which activity they would instead include in their lesson plans - PPT or VR?
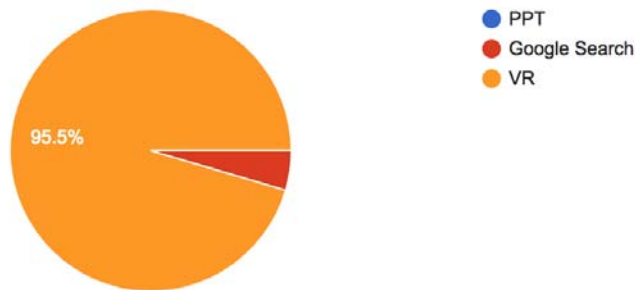

Figure 8. The table below reveals student comments about the differences in the two activities (PPT and VR).

VR is more engaging
Looking up the power point was tedious and boring and the information I found seemed blah compared to the virtual reality.
The VR was much more engaging because I could actually see the places. The power points gave me more information than experience.
The power points were so different based off of what you clicked so it would be kind of confusing. VR headsets with the app made the activities engaging
Virtual Reality was more engaging ecause it really felt like we were experiencing it ourselves. The researching of the powerpoint was cool, but there were not many that I felt was especially aesthetically pleasing nor informative.
VR was more fun and involved
the VR world
The VR really allowed you to see more about the cities and places we visited. Instead of just a picture of the actual thing, we got to see it and what is around the particular place. On the power point we were only able to see a simple picture.
The Virtual Reality (VR) activities was more interesting and exciting than looking at the power point presentations.

Future Possibilities with OER and VR

The Internet has vastly increased the amount of information accessible to classrooms. In the same way, OER and VR increase learning opportunities by offering flexible lesson planning and additional opportunities for students to choose their mode of learning. These digital resources transform education and bring the outside world into the classroom. OER and VR are increasingly becoming the digital tools of choice for lessons that promote the student-centered concept. When exploring these technologies, learners can control what they research, which results in personalized learning experiences that are self-centered (Afolabi, 2017). Due to the flexibility and openness of these digital tools, there is more room for instructors to integrate best teaching practices into their instruction, which increases student knowledge and skills (McGreal, 2017). Additionally, using OER and VR enable instructors to provide more differentiated and customized instruction in the classroom, which opens the opportunity to meet the needs of diverse learners (Kwak, 2017). This technology is an essential factor in assisting universities in delivering high-quality education.

Summary

At the onset of working with OER and VR in the higher education classroom, one becomes skeptical about how students will truly gain academic value. However, after incorporating these technologies into classroom instruction, the researchers found that higher education instructors would be doing students a disservice by not integrating this technology into daily lessons. Additionally, it was revealed that there are strengths to the use of OER and VR. Aside from the educational benefits of being able to take students outside of the classroom without actually traveling; VR is an avenue for exploring the jungles of Africa, museums in Italy, or war zones around the world. One of the significant benefits is being able to move safely around dangerous places while remaining far away from the real dangers" (Freina & Ott, 2015). A challenge for students is to understand how to explore regarding academics. Therefore, the use of VR

and the ability to navigate while learning can be a new experience for students. Students gain skills through the use of VR, even when the experiences are for recreational purposes. Additionally, OER provides current material relevant to today's learners, which assist instructors in maximizing engagement throughout lesson delivery.

For the most part, today's students are tech-savvy and grasp the concept of newly implemented applications with ease. It is not to say that notebook paper, pencils, or chalkboards are no longer needed, but there is a need to stimulate students in areas that challenge them in several areas. By using OER and VR, educators and students can thrive, and the educational experience becomes not only more enjoyable but can leave longer-lasting impressions on the students.

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