

The Effect of Digital Tools on Reading Comprehension, Focus and Engagement

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Abstract

This study sets out to explore how the use of an Interactive Digital Response System called Nearpod, in conjunction with sustained silent reading allows high-school students to engage in texts on a deeper level and motivates students to continue reading more often and for longer periods of focused attention. Forty-five Game Design students participated in traditional and non-traditional digital question-and-answer activities after reading chapters from a teacher-chosen book set at a lexile level slightly below the reading levels of most of the class. They were asked to self-assess their reading engagement levels before reading and then after reading and answering comprehension questions. At the end of the study they were asked to respond to open-ended questions about their experiences with the non-traditional digital interactive response system as compared to the traditional method question and answer method. Throughout the study, the researcher kept an observation journal to record body language and what students said aloud as they participated in the process.



Keywords:

Interactive, digital tools, digital response, nearpod, computers, education, silent sustained reading, SSR, engagement, comprehension, focus, students, technology, interactive discussion, college, high school.

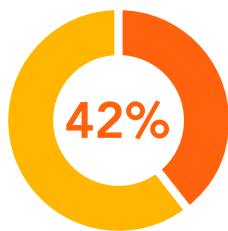
Introduction

National

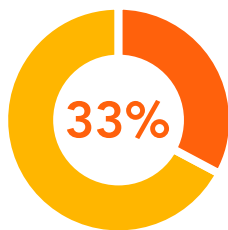
According to the policy brief by the National Center for Public Policy and Higher Education and the Southern Regional Education Board (2010), every year in the United States, nearly 60 percent of first-year college students discover that, despite being fully eligible to attend college, they are not academically ready for postsecondary studies. In a related report the 2015 reading portion of the National Assessment of Educational Progress, only 42 percent of females and 33 percent of males are reading at or above proficient levels when tested in the 12th grade.

Percentage of Students Reading at or Above Proficient in 12th Grade

Females



Males



In the U.S., educators and students use the ACT, PSAT, and SAT tests to gauge readiness for college. Some states have set college readiness standards in terms of cut-off scores on these standardized tests. Standardized tests are valued for their ability to predict college success. According to ACT's latest national policy report, (2015) a comparison of assessments of ACT and PISA, an international assessment of college and career readiness, literacy and problem solving skills is indeed a good assessment of how U.S. students perform on a global stage. The ACT results show that the performance standard of college and career readiness – and therefore the new Common Core State Standards, which were designed to help all U. S. students become ready for college and career, is internationally competitive, falling well within the rank of the highest-performing countries on PISA reading and math.

Thus, if ACT truly is a good indication of how American students perform on the world stage educationally, how do U.S. students fare when taking the ACT? According to the ACT national report (2015), 31% of the ACT-tested graduating class is not meeting any of the Benchmarks, which make it difficult for them in their post-high school experiences. Despite this disheartening news, the

possibilities for improvement are attainable. Nationwide, an opportunity to improve on student college and career readiness can be found in reading and science, where at least 10% of the students were only 1 or 2 points below the benchmark. Ultimately, by concentrating on improving literacy and problem-solving at the high school level, we can make a big difference, both in getting more students prepared for college, and in preparing more students to compete on an international level.

State

Concentrating on the reading/literacy portion of testing at the state level, the nascent California Assessment of Student Performance and Progress (CAASPP), was implemented for the first time in 2015 and is substantially different from its predecessors. According to a news release from the office of Tom Torlakson, the State Superintendent of Public Education, (2015, September 9), The tests for English language/literacy were given to students in grades three through eight and grade eleven. They included an adaptive test taken on a computer and a second performance task that challenged students to apply their knowledge and skills to real-world problems. The two parts measure depth of understanding, writing, research and problem-solving skills. According to results reported in early September 2015, less than half of all California students passed the English portion of the tests which are aligned with the Common

Core standards and considered indicators of college and career readiness. Given that the CAASP tests are new and students and teachers are adapting to the new test, we can look at this data as baseline information, rather than a complete assessment of where students stand in their readiness for college. However, married with SAT and ACT results as well, we can see a trend where about less than half of students, both nationwide and in California are ready for college.

Local

Reviewing this issue at a local level, this study includes one Northern California project-based learning school. Students at this school are all required to take at least four college-level classes at the community college or online in order to graduate. The studied school does not offer AP courses, but does offer many college classes after school on campus that are open to high school students, and the community college is close by. Students who attend these classes often report anecdotally, that they are not prepared for the level and amount of reading required for these college classes and have expressed a desire to better prepare for these classes through more high school level reading practice.

Statement of the Problem

Often in a Project-Based Learning (PBL) environment the reading required for projects comes in the form of student-chosen research articles, and other short reading assignments. Because of the movement away from traditional “book” learning to a more expanded, experiential and multi-media approach, the shifted focus has caused a split between preparing students for the “real” world, versus preparing students for more traditional college experiences. According to the most recent New Tech Network Student Outcomes Report (2015) which recognizes the need for a broader skillset, PBL does prepare students well for life after college with an emphasis on collaboration, oral communication, written communication, content and knowledge and agency skills. However, PBL educators must also look at how they can best prepare their students for their next steps into upper academia, a step that comes before entering the real world for the many high schoolers who are college-bound. Deeper thinking and problem-solving skills will certainly be a great asset to those students attending college. However, it is important to note that more traditional reading, writing and study skills will also serve those students well in college, and need to be nurtured in high school. There is a question as to whether PBL provides that needed focus on more traditional learning skills.



Background and Need

Although the need to support students to be better prepared for more rigorous college-level reading has been identified in this PBL school, the question remains, does this reflect other experiences at more traditional high schools as well? According to a survey done at a more traditional school in North Carolina, which assessed the perspectives of high school seniors toward reading and the relationship to college preparedness by Hooley, Tysseling, and Ray, (2013), most students thought that they were prepared to meet the challenge of college-level reading. Despite this outlook, almost half of the 64 students surveyed said that 20 minutes of reading was too long. They also reported that they did not do much academic reading or recreational reading. Only 54% said that they actually did some of the assigned class reading. Of the teachers interviewed in this study, one pointed out that she believed that students are conditioned to view reading as drudgery. In addition to lack of engagement in the reading process, it is often hard to know if students are comprehending the reading that they do in and out of class, a subject explored in depth in a recent study by Hiebert, Wilson and Trainin (2014, February).

By doing the study for this action research paper, the researcher hopes to deepen the

practice of preparing students, not only for the real world after college, but also for the workload they are sure to experience when they attend college or university. This action research project is focused on how to create more opportunities for improved reading engagement and comprehension through Silent Sustained Reading (SSR).



Purpose of the Project

The purpose of the study is to gain a better understanding of how to best engage students in the Silent Sustained Reading process so that ultimately, they will be better readers and better prepared for college and career reading. The research question posits,

“ *What effect does using an interactive digital response system (Nearpod) have on reading engagement, focus and comprehension?* ”

According to a study by Apple about learning in the 21st century, (2006) most students expect to learn in an environment that mirrors

their lives and their futures. That environment includes a full integration of digital tools that invites collaboration in physical and virtual spaces. The study points out that most schools provide the exact opposite environment, where students are expected to put away their smartphones and digital devices in order to learn in a classroom setting. The article goes on to talk about how the integration of technology leads to more engagement and better learning. In alignment with the Apple study, the researcher’s hypothesis presupposes that by using a digital tool, such as an interactive digital response system, student engagement and comprehension will increase compared to using a traditional “read-and-answer-questions” process.



Methodology

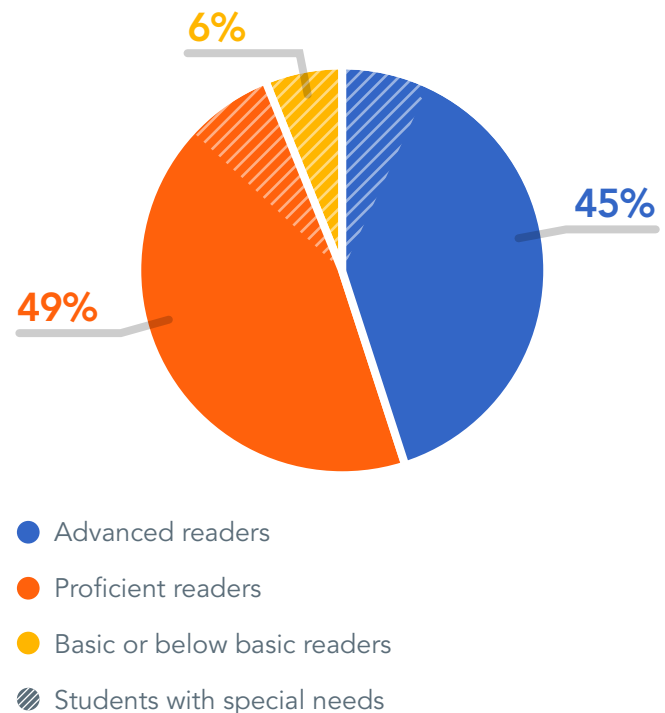
Study Design

This is a Mixed Method Study that includes both quantitative and qualitative data collection. The quantitative study design includes a one-group pretest/posttest model. To establish a baseline, students self-assessed their level of engagement, using a scale from 0-100, before reading a chapter from a teacher-chosen novel pertaining to class content. Students were then asked to read and answer comprehension questions similar to traditional teaching techniques. After answering the questions, students were again asked to self-assess levels of engagement.

This same self-assessment before reading was done again in the following class. However, this time students were asked to answer comprehension questions through the use of an interactive digital response system, called Nearpod, which included visuals and questions that appeared on student screens and could be answered individually. The answers would then appear on the teacher's screen, and then the teacher could share some of the student answers while keeping answers anonymous. This allowed the teacher to share with students what a correct answer might look like, or to provide means for further discussion in the entire group. After using the digital format, they again self-assessed their levels of engagement.

For qualitative data, the researcher kept a journal of observations of what the students said and did before, during, and after the reading and question-answering sessions. Students were also asked to respond to open-ended questions asking for feedback about using the digital tool versus the more traditional question-answer methods. The constant comparative method was used to analyze the classroom observations as well as the responses to the survey in order to find patterns and trends in the qualitative data.

Student Profile - 45 students



Based on analyzing pre-existing SRI data, it has been established prior to this study that, of the 45 students in this survey who range from 10th-12th grade, 1 student read at below-basic level, 2 students read at basic level, 20 students read at the proficient level and 22 students read at the advanced level. There were 9 students who had 504's, EIP's, were English Language Learners or had other special needs. The student population included all members of an elective class. No students were singled out from this class and all students in the elective class were included in the study.

Taking cues from another study (Kelley and Clausen-Grace, 2006) that reviewed SSR procedures and outcomes, the researcher created the rule that no one could get up during the reading time. Restroom and water breaks were given before and after the SSR time. A brief survey taken at the beginning of the year allowed students to comment on whether they consider themselves readers, whether their parents consider themselves readers and the availability of books in the home. This helped to create clear profiles of each member of the study group before beginning the study.

By comparing data, the researcher looked for

a difference between engagement levels from traditional teaching methods and engagement levels from those teaching methods that include the interactive digital response system. The researcher also looked for observations of engaged and disengaged behaviors such as verbal and body language cues.

Having students self-assess was the best way to collect the data about levels of engagement since students were accustomed to use self-reflective techniques on a regular basis when working within the model of project-based learning. In this way, the researcher took advantage of methods students were already comfortable with and were adept at using.

Engagement surveys were administered through Google forms, a tool that all students in the class were familiar with. Data was then used to populate a spreadsheet that allowed for ease of use in analyzing data. Data about levels of engagement were collected using a 0-100 scale. Students referred to a digital link to fill out the Google form and used the same form each time they rated their level of engagement to provide for consistent data collection. Any data that is shared in this paper has been stripped of identifying information.

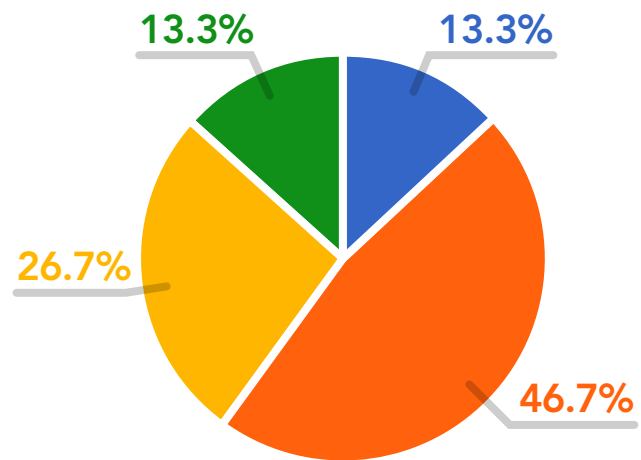
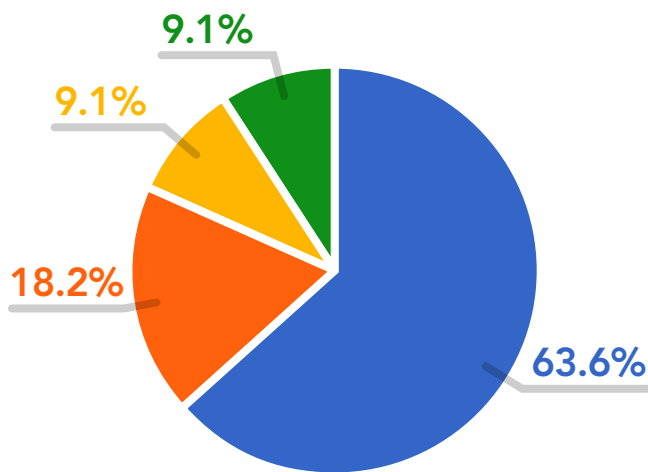
Data Analysis & Interpretation

Using an observation log, the researcher made 11 observations of students before, during and after they read a chapter from the teacher-chosen book in one session using traditional question-and-answer methods and 14 observations of students using the interactive digital response system after reading. The types of observations recorded included either body language, written behavior (via emails), verbal behavior or a combination of verbal behavior and body language as seen in Table 1.

Table 1

Traditional Method: Verbal/Written/
Body Language Observations

Digital Interactive Tool: Verbal/Written/
Body Language Observations

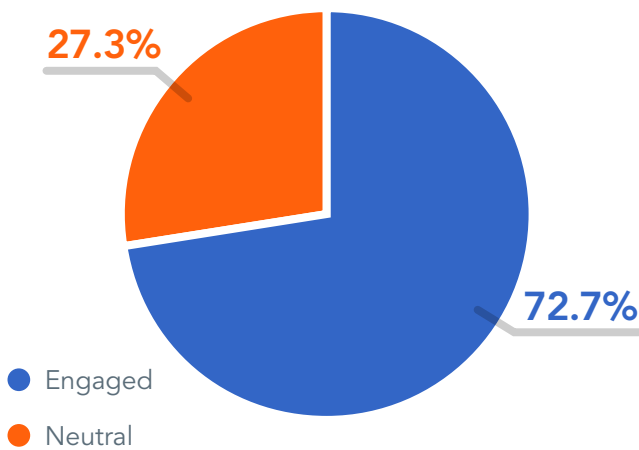


- Verbal Behavior
- Body Language
- Verbal Behavior and Body Language
- Written Behavior

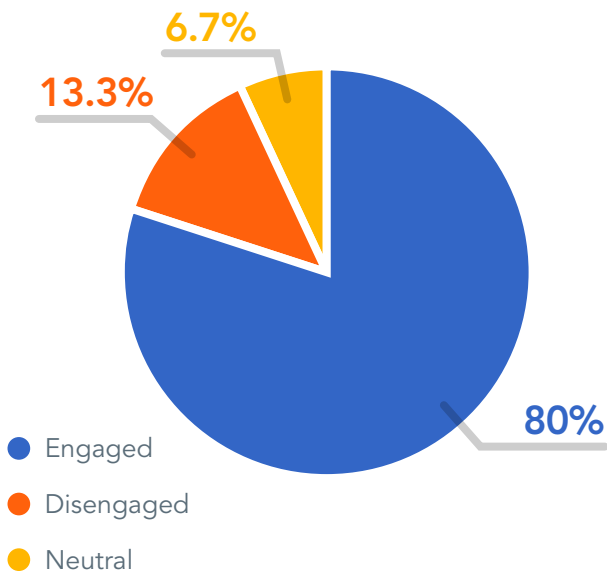
All types of observations recorded evidence of engagement (E), disengagement (D) and neutrality (N).

Table 2

Traditional Method: Evidence of Engagement/Disengagement/Neutrality



Digital Interactive Tool: Evidence of Engagement/Disengagement/Neutrality



As you can see, in Table 2, there was no recorded evidence of disengagement in the traditional model, 72.7% of the observations recording engagement, and 27.3% recording neutral behaviors. Table 2 also shows the data for the observed behavior of engagement during the session using the interactive digital response system. Observations in this set show 80% of observations recording engagement, 13.3% showing disengagement, and 6.7% recording neutral behavior. According to word count, number of correct answers, and depth of answers, comprehension of the chapters stayed constant over the two sessions.

From these results one can see that there was an

“ Increase in observed engagement of 7.3% when using the interactive digital response system ”

increase in observed engagement of 7.3% when using the interactive digital response system. Observed engagement included lots of fist pumping accompanied by students shouting “Yes!”, proud head wagging, thank you’s from students, furious typing and most students staying until 3pm on the dot to get

the questions answered in the digital tool. This raises the question of how to weight each observation? When the entire class was observed doing something, does that count as 30 individual events? The numbers would show a much higher increase in observed engagement if that were the case.

It is also believed that with further use of the tool, adjusting for the needs of the class as progress is made through the reading material, the level of engagement could be increased even further.

In order to triangulate the data for engagement, the researcher also asked study participants to self-assess their levels of engagement from 0-100 before reading and then after answering questions, for both the traditional and digital formats. The difference between the two scores was recorded for each session. The final sample size was reduced from 45 down to 38 due to absences and incomplete survey data from several students.

The results from the self-assessment creates a T test score of .4905 which shows that statistically, there is no relationship that can be seen between self-assessed engagement scores before or after using Nearpod. These quantitative results did not match the qualitative data collected in the observation log, nor do the data match the qualitative data collected in the open-ended question survey (see below).

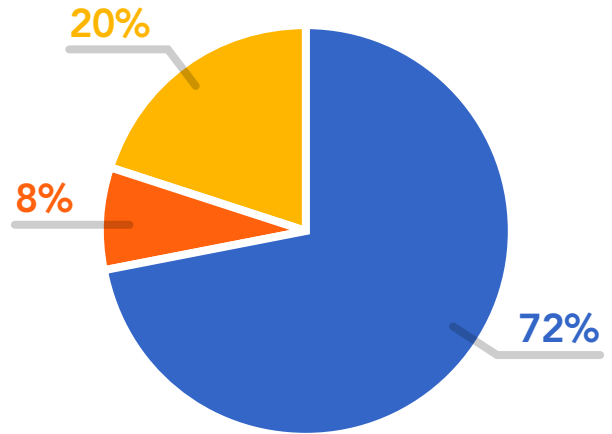
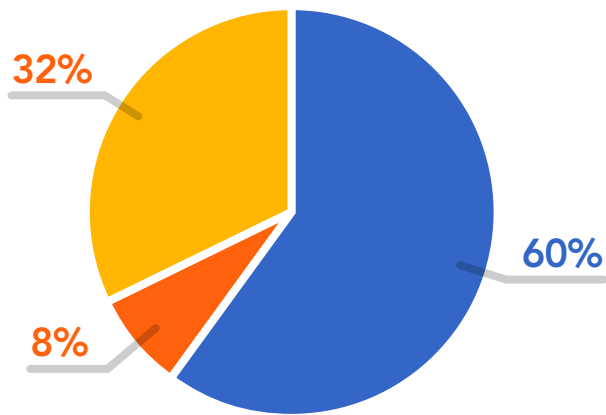
It is important to note that many of the resulting low point-differences of engagement (0-5 points) came from students who were already engaged at a high level, those scoring 95-100 to begin with, and included 7 such students in the traditional session and 9 students in the interactive digital tool session. These students had no way to realistically record significantly increased engagement as the scale was only set to 100 points and they scored themselves high to begin with.

As mentioned prior, a third method of determining engagement came in the form of a survey asking students three open-ended questions: Responses were categorized as positive, negative or neutral. Table 3 shows the results of all three questions.

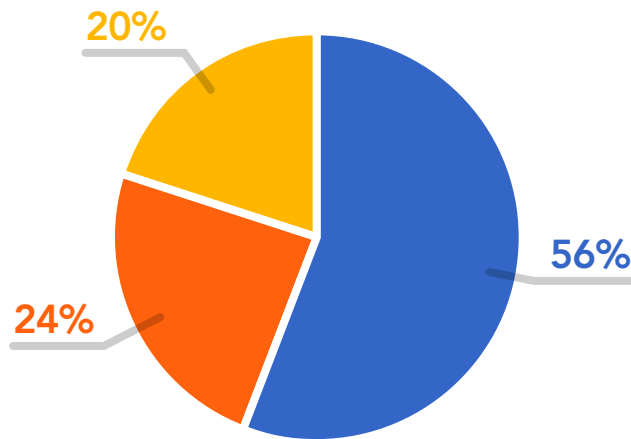
Table 3

How did Nearpod help you or not help you with your reading?

Describe how Nearpod made your reading different for you



Digital Interactive Tool: Evidence of Engagement/Disengagement/Neutrality



- Positive
- Negative
- Neutral

All three sets of responses showed a higher number of positive responses compared to negative or neutral responses. If neutral responses are taken out of the analysis to isolate the relationship between only negative and positive answers, positive answers then rank 83% for the first question, 90% for the second and 70% for the third question, a result showing that students had an overall positive response to using the digital tool.

Some examples of positive student responses to the open-ended questions are shared below.

In all of these comments, the students are speaking to how the digital tool allowed for more and deeper reflection on the reading material. In addition to the concept of reflection, increased reading focus was also the result for many of the students, according to the following student responses.

Sampling of Student Feedback

“Nearpod made me reflect on the book a bit more.”

“Nearpod just kept me engaged to continue reading until the end in order to participate in the (interactive) activity.”

“I liked it. It made me really think about what I just read.”

“I liked the Nearpod activity because it keeps you more engaged than just reading alone. Because you can look forward to do something with what you read instead of just sitting there with your thoughts to yourself.”

“I like Nearpod because it helps us review our reading as well as influenced us to pay attention closer to the book rather than just skimming the words.”

In addition, the Nearpod provided opportunity to extend engagement with the content over a longer period of time, affecting memory of said content.

“ I think I better remember the story with Nearpod. ”

“ Nearpod made me think about what I had read afterwards, which I feel helped increase my overall comprehension of the book. ”

Lastly, and probably the most significant in the researcher’s mind, is this comment about engagement, as individuals and as a class, when oral discussion was paired with the digital tool.

“ It was fun to have a kind of full-class discussion after the reading that was facilitated by Nearpod. Usually, other classes just have us read and not really talk about what was read. Kind of makes the reading feel more meaningful. ”



When looking at the negative comments, it is important to go beyond the number of comments and look at the nature of these comments. Most comments centered around the fact that the use of the digital tool, caused the students to have to focus on useless details, things that distracted from the overall plot of the book. Both negative and neutral comments included a general outlook from students that reading should be done uninterrupted and for pleasure, and that any intervention was simply a distraction.

"I didn't like because it took me away from just enjoying the book."

"Personally, I like reading without Nearpod because it feels more natural."

"When I read without Nearpod I can focus more on the plot and not insignificant details"

The researcher, in the interest of being consistent and unbiased, used comprehension questions from a website created by another teacher. Many of the negative comments about paying attention to "useless facts" could be addressed by changing the comprehension questions to discussion questions that help students to think more deeply about overall plot, character development and other big-picture questions. Having said this, it is important to note that students have a desire to read for pleasure, and that this should not be dismissed in favor of meeting

the needs of the teacher, rather than the student.

Lastly, there was an issue with the mechanics of using the interactive digital tool. One student expressed frustration over the wait time between reading and answering the questions when using the digital tool.

Given that the positive comments far outweigh the negatives, ranging from 70-90% positive responses depending on the question, the results point to a significantly positive response from the students. Using the negative comments as a means to tweak the use of the digital tool would only help to further refine the use of said tool. The most frequent words used in all of the responses include "reading," "helped," "book," "like," "better," and "fun."



Recommendations and Summary

According to a study about curriculum-based technology integration, (2009) effective teaching requires knowledge of both the activity structures/types that are appropriate for teaching specific content and the manners in which particular technologies can be utilized as part of the lesson, project, or design. In this vein, it is suggested that the use of an interactive digital response system can and should be used to facilitate book discussion sessions, but may not be appropriate or effective for administering traditional comprehension questions. When students were provided a list of comprehension questions before reading, they were more comfortable answering the questions as they went along through the chapter in the traditional approach. Some of the open-ended answers from students indicated that the wait-time in between reading and getting to the questions on the digital tool was a source of frustration. Having said this, questions used in the interactive digital response system should concentrate on bigger picture questions that include plot, character development and deeper thinking questions.

“Based on triangulated data collection, the researcher would recommend using Nearpod in the classroom to help with reading comprehension, focus and engagement at the high school level.”

The tool provides visual images to help engage multiple senses, provides a way for students to think about their own individual responses prior to discussing in a group, and provides a way of engaging with the material that echoes students' digitally connected lives outside of the classroom. It is important to note that engagement levels were higher than those in the traditional method, but that further adjustments to when and where the tool is used could cause an even greater increase in engagement.

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