Increasing Special Education Students’ Literacy Through the Use of Specific Assistive Technology

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Increasing Special Education Students’ Literacy Through the Use of Specific Assistive Technology

An Action Research Report
By Elizabeth A. Davidson and Liana M. Lingofelt
Increasing Special Education Students’ Literacy
Through the Use of Specific Assistive Technology

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in fulfillment of final requirements for the MAED degree

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Abstract

The intent of this study was to see how specific online tools could be used to increase special education students’ literacy. The study took place in two public high schools in metropolitan areas. The students involved in the study included both general and special education students, males and females, and grade levels 9 through 12. Data was collected using pre- and post-assessment reading tests, student/teacher reflections, vocabulary practice, and annotated readings. The study demonstrated the importance of factors we had not fully considered in planning the action research project, including the learning curve students experience using new technology. Student literacy skills showed no significant gains as a result of our intervention. We did improve on how to incorporate technology into our classrooms and in understanding how to complete a study on reading comprehension. We also learned how district controlled pieces, such as IT support, professional development, choice based costs, etc., impact teacher effectiveness.

Keywords: literacy, reading comprehension, technology integration, special education, iPads, Google Docs
Our school districts' emphasize the importance of improving student reading skills. Whether you teach English, science, mathematics, or art, the push to embed reading instruction is an area of focus (Christophe, 2011). Over the past several years, we have noticed this emphasis is paramount with our special education (SPED) population. With the desire to have more SPED students enrolled in traditional “mainstream” courses, there is an increase in the number of SPED students that need help with their reading skills.

Our districts increasingly rely on technology to support teaching and student engagement; it made sense to us to find a way to incorporate technology into our effort to improve students’ reading skills. A wide-range of supportive technologies are available today for free or minimal costs; these technologies could help teachers differentiate student learning. Given recent improvements in student access to technology, we identified best practices for improving students’ reading levels using technology as a tool for success.

Our action research takes place in two high school classrooms in two different districts. Both districts are located in metropolitan areas, with one considered an urban district, while the other a first-tier suburban district. One classroom is an 11th and 12th grade combined chemistry classroom, while the other two classrooms are combined 9th and 10th grade language arts classrooms. The instructor of the language arts classes is a veteran teacher with 15 years of experience--in urban/metropolitan districts, with two of the years spent as a Teacher on Special Assignment (district level content area coach).
The instructor of the science class has been teaching in a metropolitan district for the last six years, where she has taught an intervention science course.

The classes involved in this study are intervention courses that are intended to help students who are not succeeding academically for various reasons, including having below level reading skills. Special education students are heavily concentrated within these courses. We conducted our research with 74 students in our intervention classes. We have 47 male students and 27 female students. While all students are not classified as SPED, the best practices implemented through this study are valid tools for all students needing intervention courses.

When determining why we wanted to focus on reading comprehension, we looked at standardized testing that our students have done in the past. 92% of the students in our intervention classes have scored either Partially Meets Standard or Does Not Meet Standard on either the eighth grade MCA III reading test or the tenth grade MCA III reading test, or do not have prior MCA data on record. We wanted to see if teaching our students the specific skill of annotating a text and/or story map would improve their ability to comprehend non-fiction texts. According to Zywica and Gomez (2008), annotation allows students to become more independent in their reading and improves reading comprehension. The SPED categories that we considered in designing this study in particular include Specific Learning Disability (SLD) and Emotional or Behavioral Disorder (EBD) students.

Since technology is being implemented more both within schools and in students’ everyday lives, we wanted to give our students more experience with different digital applications that could help them be more successful with reading. Retter, Anderson and
Kieran’s (2013) research gave positive guidance on incorporating iPads into a secondary classroom when focusing on reading. They used iPads to work on reading comprehension, vocabulary and fluency. Retter, et al. (2013) also found that students were more focused when using iPads and technology.

With specific consideration for our SPED population, students will also be given the opportunity to use Google Docs for work completion and other assistive technology (AT) applications. As we know, a positive benefit for using technology to promote literacy with SPED students is that it provides students with individualized support that a teacher might not have time to provide. Because of this, we will try to incorporate AT where it is appropriate.

As we were aware of Quick’s (2014) research, we knew that there could be an overwhelming number of applications available to use, and that it could become difficult to navigate them all. We had hoped to be able to receive support in finding relevant applications from our respective districts, as we didn’t want to become part of the two-thirds of teachers, reported by Biancarosa and Griffiths (2012), that receive little to no technology-related professional-development when receiving technology like iPads.

When beginning our research, we knew that we wanted to work on reading and incorporating technology, since both are large focuses within education at this time. Since we teach different subjects, while both teaching intervention classes, we thought that we should focus on reading non-fiction text with our students. With this in mind, we asked the question: To what extent can digital tools that are targeting SPED students’ skills in reading comprehension of non-fiction texts improve their outcomes over a six week intervention period?
Review of Literature

The concept of literacy has drastically changed over the past thirty years. Literacy no longer refers simply to reading and writing a paper text. Now, a person needs to be technologically literate as well as literate in the traditional sense (Patterson, 2005). As access to digital content becomes more prevalent, it is essential that students learn to navigate a digital learning environment (Anderson-Inman, 2009). The ability to shift and learn in a digital environment is of extra import for SPED students (Smedley & Higgins, 2005). As technology-based applications give access to previously inaccessible experiences, SPED students can enrich their learning in a variety of ways. The use of technology-based applications also addresses the different learning styles of students, thus creating even more learning opportunities (Smedley & Higgins, 2005). The purpose of this literature review is to look at the existing research that has been done around the use of assistive technology with specific SPED student groups, in an effort to improve their literacy skills.

In the state of Minnesota, students need to fall under one of thirteen specific categorical disability groups in order to qualify for SPED services (Categorical Disabilities, 2014, para. 1). This study attended to the needs of two specific categorical disability groups: emotional or behavioral disorders and specific learning disabilities. The category of Specific Learning Disability (SLD) is labeled as a disorder where “one or more of the basic psychological processes involved in understanding or in using spoken or written language” is impacted (Specific Learning Disabilities, 2014, para. 1). Since an SLD student often requires modified or alternative texts in order to be successful, assistive technology (AT) is typically necessary (Stetter & Hughes, 2010). As
technology often outpaces the knowledge of teachers, students, and their parents, there is a gap in knowledge created as to which AT would be most beneficial to a student (Berkeley & Lindstrom, 2011). This knowledge gap makes it imperative that teachers become aware of what AT is accessible to them, and to what extent those AT can help their students (Berkeley & Lindstrom, 2011). The state of Minnesota does provide an assistive technology manual (Special Education in the Classroom, 2014, para. 2); however, it was last updated in 2002. As defined by the state of Minnesota, students that qualify under the Emotional or Behavioral Disorders category (EBD), cover “a wide range of complex and challenging emotional or behavioral conditions” (Emotional or Behavioral Disorders, 2014, para. 1). These conditions may be medical, biological, or psychological in nature, as well as genetic dispositions. Regardless of the cause, the result must be that it affects the “students’ ability to learn and function in school” (Emotional or Behavioral Disorders, 2014, para. 1). Swanson, Swanson, and Hoskyn (as cited in Mitchem, Kight, Fitzgerald, Koury, & Boonseng, 2007) showed that EBD students often show similarities in their learning deficiencies as SLD students. This connection implies that assistive technology that is beneficial for SLD students can also be beneficial to EBD students.

SLD and EBD students who struggle with reading comprehension often need to be directly taught specific strategies to be successful, such as annotating text or story mapping. Zywica and Gomez (2008) explained that teaching annotation is a method that can be used in any subject and makes text more understandable for all students. Annotation allows a student to mark the text, so they understand the main ideas in the text and important words. Teachers need to show students how to annotate a text
correctly, so that they can increase their literacy skills. Zywica and Gomez (2008) also state that annotation allows students to become more independent in their reading and helps the student better understand content. Like annotating, story mapping is another comprehension tool that helps with a student’s understanding of the text. If a student is able to use a specific graphic organizer to map out the elements of a text, they have a higher rate of understanding the basics of what they are reading, for example, main idea, specific story elements, etc. (Stone, Boon, Fore, Bender, & Spencer, 2008).

Retter, Anderson and Kieran (2013) looked at iPads, and how secondary students with learning disabilities improved their reading skills by using them. They used applications on iPads and had a set schedule that 13 students followed. The researchers looked at timed reading, vocabulary, and reading comprehension, with all three done on various apps on the iPad. Retter, et al. (2013) stated that overall it was discovered that the use of the iPads had increased reading comprehension and vocabulary, but had not increased fluency. An unintended bonus that they discovered was that student behavior improved in their classrooms with the iPads as the students seemed to be more focused.

The research of Spencer and Guillaume reinforces the idea that vocabulary development is vital for students’ literacy development (2006). Along with prior knowledge, the vocabulary that a student comes to school with impacts his or her ability to comprehend and retain new information (Marzano, 2012). Students academically marginalized for reasons such as poverty, SPED, ELL, etc. often find themselves with vocabularies that are half of their classmates (Rupley, 2010). The fact that these student groups come with limited vocabularies means that they are more likely to fall behind peers with higher vocabularies, which then requires direct interventions to close the
As of 2014, there is a broad-range of common technologies that can be used everyday to help students become more literate. For example, a computer or device that has Microsoft Word on it can be used for text-to-speech by downloading a free plug-in that converts a Word document into one compatible with Microsoft Reader, which then reads text aloud (Balajthy, 2005). This software allows students to have a text read aloud to them. In addition to computers, cell phones or tablet computers can run online quiz applications like Socrative to see if a student understands a specific concept, like the main idea, from an assigned reading. These free technologies are already available to teachers and can easily be integrated into classrooms.

When using technology, problems can arise, especially with hand-held devices, such as iPads and cell phones. Since these devices have access to the internet, social media, and games, students must learn proper rules for using a hand-held device (Quick, 2014). According to Quick (2014) teaching these proper rules take time, but once students learn the proper behaviors, they excel at and enjoy using iPads.

Oddly enough, another limitation Quick discovered was that there are an overwhelming number of applications available to use. Quick (2014) advised reviewing apps, and developing a comprehensive list of apps that can help with various skills. This list is a document that will constantly be changing, but will be important for an educator to develop before implementing iPads or hand-held devices into his or her classroom. Biancarosa and Griffiths (2012) further support the idea that a comprehensive list of best apps for educators to use is essential. They also state in their report that two-thirds of teachers reported little to no technology-related professional-development when they
received devices. Teachers need guidance on the technology and how to use it.

Overall, research seems to show that there are definite advantages to using specific reading strategies, and technology, to help increase SPED students’ reading comprehension. As much of the technology is still in a nascent stage, there is not a lot of directly connected research between the two specific pieces. However, it seems clear that if a connection can be made between the two – specific reading strategies and technology – then student comprehension should increase.

**Methodology**

As both of our schools are focusing on increasing reading scores, we decided to focus our action research on how to increase reading comprehension for our SPED students when reading nonfiction. We both teach intervention courses: a basic chemistry class, and a combined 9th and 10th grade English class. Seventy-four students participated in the study: 47 boys and 27 girls. Of the 74 students, 40 have Individual Education Plans (IEP), 35 students are either EBD or SLD, and 17 are English Language Learners (ELL) The MCA is a standardized test that is required of all Minnesota students. The reading portion of the test is administered once a year in grades 3-8 and then again in 10th grade. There are four levels of achievement that a student can score: *Exceeds Standard, Meets Standard, Partially Meets Standard, and Does Not Meet Standard*. As our classes were designed to be intervention classes, the majority of our students scored either *Partially Meets Standard* (24%), or *Does Not Meet Standard* (52%). There were also a percentage of students (16%) that had no record of taking the state assessment. These scores were the primary reason we wanted literacy to be the focus of the study.
Since the MCAs were administered at least a year ago or longer, we wanted to establish a baseline for our research, so we gave a MCA style pre-assessment (Appendix B and Appendix C). It was a reading that was similar to the MCAs and focused on non-fiction text. The 9th and 10th grade students took one pre-assessment while the 11th and 12th grade students took a different pre-assessment. The differences in assessments were based on both grade level appropriateness and the different content courses the students were in. As referenced in the Review of Literature, assistive technology could be beneficial to improve students’ reading comprehension. While newer technologies like Google Docs, and Flashcards+ may not have been specifically studied, we wanted to use these technologies in a participant-guided environment to see if they could replicate the benefits of prior studies that showed vocabulary growth and annotation of text beneficial to student reading comprehension outcomes.

In the 9th and 10th grade language arts classrooms, the students would be working within a 1:1 model which means each student has her or his own iPad to use throughout the day. These are district assigned iPads, but the students have the ability to load almost any application that they may need for a class onto the iPad. Based on Retter, et al.’s (2013) work, Flashcards+ would be the main vocabulary application used. The 11th and 12th grade science classroom use a set of 30 iPads shared school wide. All applications had to be approved by the district and put onto the iPad by a designated technology specialist.

<table>
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<tr>
<th>Content</th>
<th>Grade Level</th>
<th>Technology available</th>
<th>Technology intended to be used</th>
<th>Obstacles</th>
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<tr>
<td>Science</td>
<td>11-12</td>
<td>Classroom set of iPads/computer labs</td>
<td>• Subtext- reading application • Google Doc</td>
<td>• Halfway through Subtext required payment (free was changed to $5 per</td>
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Our research process was to use action research to determine how struggling readers could use technology as a tool to help them improve their reading skills. We planned to introduce our students to a variety of support technologies to see if the technologies could help improve our students’ reading comprehension. We also wanted to see if the students were interested in using the technology in the future. We taught them two techniques based on evidence from the Review of Literature: annotating or marking the text with writing in the margins and vocabulary development.

Before we started our research project, we sent home a parent notification letter (Appendix A). The purpose of the letter was to inform the parents of the action research that would be happening in their student’s classroom, and to describe the purpose of the study. A passive-consent form was used, and parents had one week to send a copy of the letter back if they wanted their student’s data to be excluded from our research. Only one letter was returned stating they did not want their student’s data to be included.

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_Table 1 - Description of the differences in the two sites_
At the beginning of the study, we gave reading comprehension pre-tests in both science and language arts classes. The science class used an old Minnesota Comprehensive Assessment (MCA) test. The focus of the reading was on radio and television waves and had 10 multiple-choice questions that went along with the reading passage (Appendix C). As the English class had already administered an old MCA reading test earlier in the school year, these students were given a different MCA style pre-test for the purpose of this study. This reading was on the effect of rocket testing on Lapps in Sweden, and it contained five multiple-choice questions to go along with the text, along with five metacognitive questions about how the students were able to come up with their answers (Appendix B). With the pre-test, we looked at how many of the multiple-choice questions students answered correctly (reading comprehension), and also if they were purposefully using any reading techniques that have already been taught to them in previous classes (metacognitive questions). Along with helping us to understand what areas we needed to focus on, our pre-test also allowed us to better understand the reading strategies with which our students were already familiar.

Throughout the study, we were going to use a variety of different applications (apps) and computer programs to help our students with reading comprehension. The science class was going to use Subtext on 30 iPads that any teacher could use in the school. We conceived that the program could help students annotate text and differentiate lessons for students. Since the iPads were used school-wide, any apps needed would have had to be set up at the district level.

We planned to use Google Docs in the science class to share a non-fiction text with students. We would ask students to highlight the text in different colors. One color
(green) was used for main ideas and another color (orange) for words they didn’t know and needed to look up. Students would also be asked to use the comment feature to “write in the margins” and summarize/make connections to the reading.

The English classes were going to have a 1:1 iPad model to work with (where each student has a personal iPad assigned to them). As vocabulary acquisition was one of the targeted focuses of our research, we incorporated the application Flashcards+ in the 9th and 10th grade combined classes. There were two vocabulary assessments that were given prior to the students being introduced to the Flashcards+ application. For those assessments, students were responsible for copying down content specific vocabulary words in their notebooks. Each word was presented by the instructor, and examples were given that students could relate to. As the words were taken from texts students had yet to encounter, connections to the reading were made when appropriate, but often the examples were connected to concepts students would already be familiar with. Students were then responsible for studying the vocabulary terms, and for having their notebooks with them in class to use during study time. During the time between the introduction of the terms and the assessment, and typically during the in-class study time, students were required to write sentences or draw pictures to show their understanding of the terms. This work was checked along the way to make sure students had a clear understanding of the terms. After the introduction of the Flashcards+ application, students were required to create a vocabulary set for the content specific vocabulary words on their iPads. Introduction of the terms was the same as before, however, students were shown how to access the pronunciation feature of the app, so they could have the word read to them later if necessary. Students were responsible for studying their vocabulary, and for
bringing their iPads to class. Students were again expected to write sentences using the given terms, or to create or find an image to associate with the term. The app allowed students to have this information right on their word card.

![Sample Flashcards+ vocabulary card](image)

*Figure 1: Sample Flashcards+ vocabulary card*

Data

For collecting data, we used pre- and post-assessments, as well as teacher and student reflection journals. The pre- and post-assessments were very similar assessments to see if the students learned strategies for reading a text, and if they increased their reading comprehension. The content in the assessments were different from the pre-assessment to the post-assessments, but the multiple-choice questions had the same degree of questioning. The teacher journals were where we kept notes on how the different technology tools were being used along with our thoughts on if they were effective or not. It also was a place where we could document our frustrations or excitements about different parts of the study. We wrote in the journals throughout the study when we used the different reading strategies. The student journals were a place where students could reflect on the different tools we used and if they thought the tools
were useful or not. They used these journals after every reading strategy that we did in class.

After collecting all of our data, we reviewed it to see if these tools were effective in helping our students with reading comprehension. It helped us create an action plan for what could be done at our schools to help our struggling readers use technology.

**Analysis of Data**

The first data we evaluated in our study was student MCA data. As mentioned earlier, within our intervention classes, 92% of our students either did not meet state proficiency standards in the eighth grade MCA III reading test or the tenth grade MCA III reading tests, or they did not have any results on record. We used the pre and post assessments (Appendix D and Appendix E) to analyze if the students improved their reading comprehension throughout the study. The two different groups (9th and 10th grade students and 11th and 12th grade students) had similar post-assessments although pre-assessments were fairly different as a result of needing to work around prior assessment
work done. Appendix J shows the full data set from our students’ assessments.

![Pre-Assessment vs Post-Assessment](image)

*Figure 2: Improvement from pre-assessment to post-assessment all students (75 students)*

When looking at Figure 2, it was challenging to determine if our really students improved. There were many factors that could have that caused either no improvement or worse scores on the post assessment; the study was not done over a long enough period of time, technology did not work or was not supported, students were not completing work as asked. Since SPED students were also a focus, Figure 3 breaks down their results in the pre-assessment and post-assessment.
In the areas of main idea and vocabulary, the 9th and 10th grade classes saw an overall increase in percentage of correct responses for the context based vocabulary question (up to 73% from 42%), however, there was an overall decrease in percentage of correct for the determining the main idea questions of the passage (down to 76% from 91%). As the main area of emphasis in the 9th and 10th grade classes was increasing vocabulary acquisition, this data seems to correlate to the work completed; however, the data from the specific vocabulary assessments seems to say otherwise. The 11th and 12th grade class main focus was reading comprehension and how to mark the text to make it easier to understand. The data from the pre and post assessment correlates with the work the students completed in class. The students who failed to mark the text due for varied reasons also failed to demonstrate improved reading comprehension.
Looking at the vocabulary assessments, it would appear that using the application did not improve student achievement. Average scores actually decreased between pre and post-test. The mean scores on the two tests administered before the introduction of the application were: 6.01/10 and 7.24/10. The mean scores on the two tests given after the introduction of the Flashcards+ application were: 4.87/10 and 5.81/10. Though this data seems to point towards the application being unsuccessful in helping students with vocabulary acquisition, it must be noted that the drop in scores could be explained by other factors. First, there were not scores for every student for every test. Almost ¼ of the students, 10 of 43, failed to record a score for at least one vocabulary test. This omission of scores impacted the overall averages both negatively and positively due to which students failed to record a score (i.e. a stronger student failed to record a score instead of a weaker student). Second, as the vocabulary chosen for each selection was content based, the vocabulary for the first two tests may have been easier for the students than the vocabulary list for the second set of tests (Appendix F and G). Third, students may have encountered issues with technology that was not connected to their vocabulary acquisition. During the second week of using the iPads and application, lost their vocabulary data when they had to be issued new iPads when their original one had already stopped working. Five additional students had issues related to the Flashcards+ application itself. Other students related iPad issues which contributed to their inability to use the flashcard tool in the manner intended. Some of these iPad issues were self-inflicted by the students, for example, losing their iPad for inappropriate use at school, but others were the result of forces beyond their control, such as the district network being down. Also, some students had difficulty adding pictures to their notecards, as
they were required to create an account to unlock that feature within the app. For those that did access the image feature, they found that though it was easier to find images on the Internet, it didn’t always mean that they were able to complete the task more quickly, as many would spend time trying to find the “perfect” image. As the purpose of having the students write sentences or create images was to increase student time on task with the vocabulary terms, the added search time was not necessarily a negative, but may have been if it didn’t add to their active processing and rehearsal time.

After implementing the vocabulary acquisition strategy of using Flashcards+ as a learning tool, we also had students complete a Google Form to record their personal reflections on using the strategy. The student reflection allowed the students to state whether they felt the strategy helped them in learning new vocabulary, as well as any other comments they would like to share. Figure 4 shows the student responses for whether they felt the Flashcard+ app helped them learn the vocabulary.
The students were also able to comment on using the app in their Google Form reflection. There were only a few specific comments from the 41 students that filled out the reflection form. The most common response (noted by five students) was that the app was better because they couldn’t lose their vocabulary anymore. Four other students said that the app was easier to study and use. One student made the comment that they liked the feature that allowed the word to be read aloud. Having the ability to hear a word read out loud, on demand, could be a beneficial tool for SPED students and English Language Learners, who may struggle with word recognition.

Although it appeared that the Flashcards+ application did not help with student vocabulary acquisition, students seem to look at the tool favorably. Again, as mentioned earlier, there are a number of reasons that might explain the difference between students’
beliefs and actual results. At this time, given the small sample size and students favorable view of the application, it may be too soon to make a decision on the viability of using digital flashcard tools as a means to increase students’ reading comprehension skills longer term.

Annotating the text using technology was another area that we were focusing on with the research. In science class, students were using district iPads. Since the iPads were not 1:1, district approval and loading was needed to add applications, such as Subtext, onto the iPads. By the time this occurred, Subtext had shifted to an "in app purchase" for student accounts. Students were no longer allowed to interact with the text as the science teacher had planned.

This change in Subtext prompted a change to Google Docs as our digital host for students to practice annotation skills. We rehearsed this skill on their devices as a class, with the teacher helping students to pull out main ideas and key phrases. Students did the second half on their own and answered questions on a Google Form. Figure 5 shows how the percentage of students who correctly answered the questions in the Google Form.
Questions 1 through 5 were connected to the section of reading that had teacher assistance with annotating the text. The students were responsible for annotating the remainder of the reading individually, following the technique that was modeled, and questions 6 through 10 went with that section of reading.

Looking at the data, the average percentage of correct answers with teacher support with annotating was 70.9%, while the average percentage of correct answers with students working on their own was 33.4%. The data seems to point towards the idea that students were unable to improve their reading comprehension without teacher assistance. However, when looking at the students’ work samples, 30 out of 44 students did not make any annotations in their text for the second half of the reading. Since students appeared not to have used the instructed skill, it is impossible to determine if the skill would have helped their comprehension. This could have been the result of students not completing the reading and just trying to answer the questions. This lack of annotation
could have also been the result of students having just skimmed over the reading without pulling out the main ideas. Question number 9 had a particularly low percentage of students answering it correctly. The format of this question was not multiple-choice like the others, but a short answer question where the students had to type in an answer. While the answer was pulled directly from the reading, a few students had typing errors, such as writing a chemical compounds name incorrectly. While it was a technicality, it was still not the correct answer. A majority of the students didn’t answer it correctly, or did not type in an answer at all. Question 7 also had a low percentage of correct responses. Unlike question 9, this question was formatted as a standard multiple-choice question. Even though the question’s format was basic, the question itself required higher-level thinking, as the answer was not explicitly in the reading. The answer was based on the main idea of the entire text, so students needed to understand the whole text in order to answer the question correctly. If students just skimmed the second section instead of reading it carefully, they would not fully understand the question. This skimming and not doing the strategy assigned to complete the reading seemed to be the main reason why roughly 85% of the students answered the question incorrectly.

In retrospect, we could have better scaffold the assessments ensuring students were focusing on the targeted skill rather than jumping to the intended, broader outcome that would happen if they mastered the targeted skill. When looking at reading comprehension, there are many different parts to the skill, and each have a learning curve.

The student reflections on the reading strategies used (Appendix F) included a self-ranking in on the categories listed in Table 2 on a scale of 1-5 with 1 being the
lowest and 5 being the highest. Table 2 shows the responses from the student reflections on the annotated reading completed in the 11th and 12th grade class.

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<th>Reflection Questions</th>
<th>Arithmetic Mean out of 5, with Standard Deviation</th>
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<tbody>
<tr>
<td>Rate your level of understanding of the strategy overall</td>
<td>2.8 ± 0.98</td>
</tr>
<tr>
<td>Rate how the reading strategy we used today helped you interpret the assigned reading</td>
<td>2.4 ± 0.74</td>
</tr>
<tr>
<td>How likely would you use this strategy on your own in the future?</td>
<td>1.6 ± .60</td>
</tr>
</tbody>
</table>

*Table 2. Student Reflection on Google Doc Reading (n=37)*

Students also had the opportunity to answer an open-ended question regarding their experience using technology to annotate text. Students did not find that computers were easier to use and preferred not to continue. When reading, students liked to use paper and pencil instead of technology.

Looking at the data from these two sources, it is clear that students struggled with reading and annotating a text in Google Docs. Since it was not accessible enough for them to do on their own, 68% did not complete the reading and did not pass with a 60% or higher on the question set. In their reflections, 25 out of the 37 students stated they would not use this reading strategy. 15 out of the same 25 students also stated they didn't like using the computer. This makes it difficult to understand if the students do not want
to use the reading strategy or if they don't like this type of reading strategy on the computer. In both the Language Arts and science classrooms, Google Docs worked well on a desktop computer, but did not work on the iPad. Students could not use the edit functions on their iPads. A discussion with a technology TOSA about the lack of access to certain tools in Google Docs revealed a distressing fact – as Google wants to try to create more of a market for their technology, they purposefully hold back certain elements from their Apple based Google Drive apps. In this way, Google can still have a place on Apple products, like the iPad, however, it still allows them to market their own hardware (Chromebooks), as having superior productivity features.

The teacher reflection (Appendix G) from the same day showed similar frustrations as the students. The teacher had to rate the following feelings from the day with 1 being the students were not understanding to 5 the students were becoming an expert on the reading strategy or main ideas. When the teacher was reflecting about the type of reading strategy used, annotating the text, she felt that the students understood the strategy, using highlighting to point out the main ideas and writing comments in the margin, since she ranked it 3 out of 5. The teacher had similar frustrations as the students when using the technology. She felt that the technology was challenging to use and did not assist the students in better understanding the actual reading. In the teacher's reflections, she ranked it 2 out of 5 in this category.

The teachers answered open-ended questions about the reading strategies or how the day went. Similar frustrations were shared by the teachers – technology not cooperating, time wasted changing locations in order to try the skill using desktop computers etc. The teachers stated in their reflections that the students just wanted to
move onto the question set and not finish annotating the text, which was the main purpose of using the Google Docs.

Also teachers noted the need to access better applications. For example, we anticipated that Subtext would be a great tool for the students to use. Unfortunately, for the students to interact with the application, it needed to be upgraded to premium status. Even though it still seems like it would be a great tool to use, the cost proved prohibitive.

Aside from having the same “in app purchase” difficulty with Subtext that was experienced in the science class, the Language Arts teacher also faced some limitations due to the way the district set-up student iPads. Since the district was unsure how to regulate iPad content, all student iPads were open to allow almost any app to be downloaded. Unfortunately, in an effort to try to gain some control over student content, the district restricted how some apps could access content. For example, since Facebook is a district-blocked site, any app that connected to Facebook would not work. This posed a problem, as Flashcards by Dictionary.com was an app linked to Facebook.

Knowing that the vocabulary aspect of the study was going to be a key part for our students, the Language arts teacher looked to find a different flashcard app after realizing that the original choice was not going to be an option. In the end, we were able to use the app Flashcards+. Students were still easily able to create flashcards for given vocabulary sets, and had access to tools like having the words pronounced for them.

Through the use of Google Apps, the Language Arts teacher was able to have students keep digital notes on their reading and has been able to have students complete presentations based on research connected to their reading. Again, like in the science class, the Language Arts teacher had some hits and misses with using Google Apps. For
the purpose of note taking, Google Docs has worked fine from a technical standpoint. Since many students found using Google Docs, to take notes, unhelpful we decided to let students choose how they would keep their notes. In the end, about one-third of the language arts students continued using Google Docs to keep their notes. The use of the Google Slides app was less effective than the use of Google Docs. There were simply too many tools missing from the site based option to make using the app worth the science students’ effort. In the end, the science teacher had to scrap having students use their iPads for their research projects, and had to use one of the school’s computer labs instead.

By incorporating technology into our practice, we learned that it sometimes takes away from what we actually want our students to learn. In our research, we wanted to focus more on helping our students increase their reading comprehension. Instead, we and our students ended up focusing more on how to use new technology. This led to more time being used to address technology related issues, rather than actually being able to focus on reading comprehension tools. As our data proved to be inconclusive, a more careful approach at looking at which aspects of the study could have been simplified so that our goals could be more realistic. Since there were many interrelated variables in our study, e.g. student reading levels, different types of content, different types of technology being used, different types of interventions, it is difficult to pinpoint which pieces of the study were most impactful. It would have been useful to isolate different variables to come to truer conclusions about the effectiveness of various interventions. For example, this study would have benefitted from looking at one particular intervention (i.e. annotation), instead of multiple interventions. It also would have benefitted from
having either the intervention or the technology more solidly in place. Introducing both proved to be overwhelming to students and instructors alike.

At the beginning of our research, we were both excited about using technology in our classroom. Since one of our schools just implemented a 1:1 system, and the other just passed a referendum to increase technology, we thought it would be beneficial to find some effective tools to enhance reading in the classroom. We also felt this was a significant area to pursue, as improving standardized reading scores has been a goal of our schools for a while. After completing our research, we realize that more research needs to be done on incorporating 1:1 in classrooms. We ran into issues on how to get specific apps onto the district iPads, wireless networks not being able to support the technology consistently, and the devices not being able to work effectively with the different apps.

**Action Plan**

This action research study was focused on how technology could assist students in improving their reading comprehension. By taking a closer look at MCA data from previous years, we saw where our students were struggling. Based on that information, we realized that students needed additional supports in reading, especially non-fiction text. These students needed supports in helping them pull the main idea out of a reading, even if they did not know the topic. Since technologies, such as iPads, have become more prevalent in the classroom (Retter, et al., 2013), we saw an opportunity to use technology as a tool to help support our students who struggled with reading.

By looking at the pre- and post- assessment data, we noticed there was not much of a gain in students’ reading comprehension. We believe that this discrepancy is due in
large part to the students we serve in intervention classes needing more time to understand how to use skills effectively. Therefore, a longer timeframe must be committed to future action research in this area. Without effective implementation, the skills of annotating or using technology will not help a student comprehend what he or she is reading. Students need to be given enough time to become comfortable and proficient with these skills independently, before new skills are introduced. With the understanding of how more time is needed for effective implementation, we plan on having our students continue to use annotation tools and technology skills. We hope that with more guidance, students will get a better understanding of how these skills can help them become more proficient readers.

Clearly, technology was not as helpful as we originally had hoped it would be. Both teacher and student reflections noted frustration with the technology. We found that the iPads were not as easy to use as we had originally believed they would be--even getting access to needed apps was very challenging. Students expressed frustration with how some of the apps were not user-friendly, nor helpful for building their reading proficiency.

Another way our research has impacted our teaching practices is by helping us rethink how effective a tool technology can be in helping increase reading comprehension. While we still use technology in our everyday teaching, we might not use it to teach reading comprehension. While our students might be moving to reading more online, studies have shown that digital texts may not be the most beneficial form when looking at comprehension (Tanner, 2014). As this is still a relatively new area of
study, there is still a great deal of research needed to form a full picture of the impact technology has on reading comprehension.

Our research has impacted our teaching by helping us realize that technology is not always the best tool to help increase student success. Though technology may be the popular intervention tool at the moment, this does not necessarily mean that it is the correct intervention for every student. For example, even though a number of students found it easier to keep their work organized on their iPads, an equal number of students were overly distracted by their iPads. This was particularly the case with our SPED students. For every positive they seemed to gain from the added technology, there seemed to be as many negatives. Also, as discussed by Biancarosa and Griffiths (2012), technology is only as effective as the teachers that are implementing it. Without adequate professional development, training, IT infrastructure and support, technology that is simply handed over to unprepared teachers or in an unsupported building is no more effective than any other intervention lacking instructor knowledge.

Potential action research opportunities that have come out of our study include researching more into what types of technology could be the most helpful for students when trying to improve reading comprehension, or other specific areas of learning. It would appear that iPads are what many school districts are incorporating into their classrooms, or are providing for a 1:1 system, but is this the best intervention tool to help with increasing student literacy? Would Google Chromebooks be a better option as a reading intervention tool since they have keyboards and a natural connection to Google software? Is going 1:1, school-wide, in the best interest for our students, or would allowing teachers the opportunity to select their own set of devices for each individual
classroom be more effective? The struggles that we experienced in our study were the lack of support that we had, the learning curve of our students using the technology and support within the building. Technology is here to stay in education. It is up to districts to find ways to incorporate it in a meaningful way. Future action research should be conducted to guide educators now, and in the future.
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Dear Parents,

As you may know, I am a St. Catherine University student pursuing a Masters of Education degree. An important part of my program is the Action Research project.

As the teacher of your child in Science/English, I, Liana Lingofelt or Elizabeth Davidson, have chosen to learn about how technology can help increase the reading comprehension of students. I am working with another educator in a different district, a faculty member at St. Kate’s, and an advisor to complete this particular project.

We will be writing about the results that we get from this research, however none of the writing that we do will include the name of this school, the names of any students, or any references that would make it possible to identify outcomes connected to a particular student. Other people will not know if your child is in my study.

When we are done, our work will be electronically available online at the St. Kate’s library in a system called Sophia, which holds published reports written by faculty and graduate students at St. Kate’s. The goal of sharing our final research study report is to help other teachers who are also trying to improve the effectiveness of their teaching.

The strategies we implement and use with our students are intended to positively impact each student’s reading comprehension skills. The benefits of using technology to achieve this include allowing students to have more tailor-made instruction and interventions, thus creating a greater chance of success. The data collected through classroom observations, student pre and post assessments, and student scores will further enhance their reading comprehension skills within our classrooms, and mark the progress made by students during this action research period.

If you decide you want your child’s data, grades, and assessment results to be in my study, you don’t need to do anything at this point.

If you decide you do NOT want your child’s data included in our study, please note that on this form and return it by January 9th, 2015. There is no penalty for not having your child involved in the study; we will simply delete his or her responses from our data set. All children will receive the same treatment in our classes, regardless of your decision on this matter. If at any time you decide you do not want your child’s data to be included in the study, we will remove included data to the best of our ability.

If you have any questions, please feel free to contact either myself, or my fellow educator, at the number listed below. You may ask questions now, or if you have any additional questions later, you can ask us or our advisor Siri Anderson, 651-690-6121 who will be happy to answer them. If you have other questions or concerns regarding the study and would like to talk to someone other than the researchers, you may also contact Dr. John Schmitt, Chair of the St. Catherine University Institutional Review Board, at (651) 690-7739.

You may keep a copy of this form for your records.
Thank You –

Elizabeth Davidson (952) 707-2267
Liana Lingofelt (651) 293-8940

Opt Out

I do NOT want my child’s data to be included in this study. Please respond by January 9th, 2015. I will return the form with my signature to you so you know that I received it.

______________________________  __________________
Name of Child                     Date

______________________________  __________________
Signature of Parent               Date

______________________________  __________________
Signature of Researcher           Date
Appendix B
Pre-Assessment Grades 9th-10th

Directions: Read the following passage and answer the questions that follow:

The Lapps, a people who herd reindeer in Sweden, have lived in the same manner for thousands of years. They are now having more contact with the modern world – they are listening to radios. They are not listening to music, however. They are listening to find out if another rocket has soared into the sky from the nearby rocket base.

The rockets are used by scientists to discover more about outer space. When the rockets return to earth, they come down in the area the Lapps use for their reindeer. The rockets break into very small pieces as they fall towards the earth, so the danger is not great. To be safe, though, the Lapps go into steel shelters, which the government has built for their protection. The reindeer have to take their chances. If reindeer could understand radio warnings, they too might run for safety! Fortunately, none of the Lapps or reindeer have been injured.

1. The best title is –
   (A) Rockets in Reindeer Land (B) Steel Shelters for Safety
   (C) Listening to Music (D) The Music of Sweden

1a. How did you determine that this title was the best?

2. The story says that scientists, to find out more about outer space, are using –
   (A) reindeer (B) telescopes
   (C) steel shelters (D) rockets

2a. Underline where you found the information above

3. The rockets return to earth in –
   (A) large chunks (B) good shape
   (C) small pieces (D) rainy weather
3a. Highlight where you found the information above

4. The story suggests that, in the past, the Lapps had little –
   (A) interest in music         (B) contact with modern cultures
   (C) time for themselves      (D) means of support

4a. What information in the article led to this conclusion?

5. The word “manner” in line two means –
   (A) community              (B) way
   (C) hope                  (D) place

5a. How were you able to determine what “manner” meant?
Appendix C
Pre-Assessment 11th-12th Grade

Under David Sarnoff’s leadership, RCA broadcast the first television program in 1939. Read this article about Sarnoff. Then answer the questions. Some questions may ask you about certain paragraphs. The numbers are found on the left side of the paragraphs.

David Sarnoff: Father of American Television
by Richard L. Mattis

1 David Sarnoff liked to think of things electronics could do for people. His many innovative ideas included radio, black-and-white television, and color television. As the head of RCA, he brought his ideas and dreams to life.

2 Sarnoff was born in 1891 in the small Jewish settlement of Uzlian in Russia. When he came to New York City at age nine, he did not know any English. His father was often ill and unable to work, so Sarnoff sold newspapers and sang in a synagogue choir to help support the family.

3 When he was fifteen, Sarnoff dropped out of school to work full-time as a messenger at a telegraph office. Fascinated by the telegraph equipment there, he bought a practice telegraph key and quickly learned Morse code.
Several months later, he got a job with the Marconi Wireless Telegraph Company of America. For eighteen months, he worked as a radio telegraph operator at the Marconi station on the Massachusetts island of Nantucket. While he was there, he read the books in the station’s technical library in order to learn as much as possible about how radio worked.

As Sarnoff learned more about radio, he began to believe that it could do more than just send the dots and dashes of Morse code. In 1915, he proposed that his company produce a “Radio Music Box” that would bring music, important events, and baseball scores into people’s homes. It took several years for the idea to catch on, but once the company started making home radios in 1922, it sold eighty-three million dollars worth in the first three years. By then, the Marconi Company had become the Radio Corporation of America (RCA).

Sarnoff realized that one radio station could reach only a limited number of people, so in 1926 he established the National Broadcasting Company (NBC) to produce and broadcast programs for two networks of radio stations. In 1937, he hired Arturo Toscanini to conduct the NBC Symphony Orchestra, which broadcast radio concerts for seventeen years.
In 1923, Sarnoff had dreamed of sending moving pictures through the air and into people’s homes. That year, Dr. Vladimir Zworykin (Zwohr'-ih-kin) of Westinghouse was working to develop an electric eye for a television camera. Many questions needed to be answered before television would be suitable for home viewing. What kind of electrical signal was best for transmitting the picture and sound? How many horizontal “lines” should be used to “draw” the picture on the picture tube? What kind of studio was best for producing television shows? Sarnoff hired Zworykin in 1929, and together they set out to answer these questions. In 1930, Sarnoff became president of RCA.

Perfecting television took longer than Sarnoff had expected, but in 1939, he was ready to present it to America. RCA began scheduled black-and-white television broadcasting with the opening of the New York World’s Fair on April 30 of that year.
9 . . . Sarnoff realized that television, like radio, would require a network of stations in order to succeed. He urged American Telephone and Telegraph (AT&T) to install cables and relay towers to link the nation together. In 1945, NBC telecast a speech by President Truman in three cities. By 1951, the NBC television network reached from coast to coast and included sixty-one stations. During that era, another national network, the Columbia Broadcasting System (CBS), grew from a group of sixteen stations. A third network still in existence today, the American Broadcasting Company (ABC), began as a radio network in 1943 when the Federal Communications Commission (FCC) forced RCA to sell one of the NBC networks it operated.

10 . . . In 1940, CBS demonstrated a color television set with a red, green, and blue disk inside its cabinet. A person looking through the disk as it spun in front of the television screen saw color pictures. Black-and-white television sets could not receive these pictures, however.

11 Sarnoff thought that color television should be completely electronic, with no moving parts. He also thought it should be compatible with black-and-white sets so that programs broadcast in color could be viewed on existing black-and-white sets and programs broadcast in black-and-white could be viewed on color sets.
12 In 1950, amid much controversy, the FCC approved the CBS color disk system as the standard for color television. Sarnoff and many others believed that a compatible system was preferable, however, RCA picked up the pace of its color research. Sarnoff told people about RCA's compatible color system in speeches, magazine articles, and demonstrations to the press. He was convincing. In 1953, the FCC reversed its decision, and the color television developed by RCA became the standard that still exists today.

Practice Reading Test

1. According to the article, which statement is an accurate detail of the history of radio?
   a. Radio was first used to provide music, news, and sports to American homes.
   b. Early radios could be run only by highly trained technicians.
   c. Once home radio production began, it took several years to become profitable.
   d. Radio was first used to send telegraphs written in Morse code.

2. According to the article, why did Sarnoff create radio and television networks?
   a. He wanted to provide more musical choices than just a symphony orchestra.
   b. Competition between networks was necessary for scientific progress.
   c. The success of the industry depended on reaching a large number of people.
   d. He knew that was the only way he could make more money.

3. The reader may conclude that this article
   a. Explain major improvements in radio and television production.
   b. Persuades the reader of the importance of electronics in the home.
   c. Describes David Sarnoff's contributions to the history of electronics.
   d. Gives detailed information about David Sarnoff's personal life.

4. Which statement shows the purpose of Sarnoff's career?
   a. Sarnoff followed the lead of Marconi, Toscanini, and Zworykin to create radio and television networks.
   b. Sarnoff's primary goal was to become president of the largest and best radio and television network.
   c. Sarnoff was often frustrated by the amount of time it took to perfect his inventions.
   d. Sarnoff saw opportunities to improve how people received information and entertainment in their homes.
5. Which statement is the main idea of paragraph 7?
   a. There were many questions about how to make television work, so Sarnoff became the president of RCA to find the answers.
   b. Producing televisions that could be used in American homes seemed such an impossible task that Sarnoff almost quit.
   c. Sarnoff and Zworykin shared the goal of beaming moving images into people's homes and worked together to make this a reality.
   d. Sarnoff hired Vladimir Zworykin to work at RCA to prevent Westinghouse from producing the first home televisions.

6. Of the events described in the article, which happened first in the history of radio and television?
   a. The ABC radio network was founded when RCA was forced to sell one of its networks.
   b. Sarnoff hired Arturo Toscanini to conduct the NBC Symphony Orchestra.
   c. NBC telecast a speech by President Truman in three cities.
   d. The FCC set the standard for color television.

7. How did the FCC's forced sale of one of the NBC networks in 1943 affect NBC's efforts to expand nationwide?
   a. NBC continued to be very successful.
   b. CBS became the only network
   c. NBC took nearly fifteen years to recover
   d. ABC grew from 16 stations.

8. In paragraph 11, what does the word compatible mean?
   a. To work together
   b. To reverse the decision
   c. To practice the code
   d. To transmit the picture
Practice Reading Test

9. The word **innovative** appears in paragraph 1. What is the best definition of the word **innovative**?
   a. Defending a new product
   b. Experiencing a personal right
   c. Beginning something new
   d. Rejecting something one time
Part I: Multiple Choice: Read each passage and answer the questions (1 pt each)

Passage 1 From *The Latehomecomer*

The baskets were full of simple things like duck and chicken eggs, dark purple eggplants, deep-red banana blossoms, and bunches of pale-green watercress. There was one woman there I particularly adored because she made the best, at least to my mouth then, *khao pad*, Thai fried rice, in the world. I stopped on my side of the fence, stared at the woman on her little stool on the other side of the fence, and waited impatiently for my grandma to catch up.

As soon as Grandma and I approached, the woman, without our asking, dribbled oil into the hot pan on her little portable coal ring. She cracked an egg. It sizzled, and she added a spoonful of rice, mixed the two, sliced a tomato, and seasoned the food with a few leaves of cilantro, a sprinkling of soy sauce, sugar, and MSG, and the air started smelling good. I followed the smell, my body moving to the barbed wire fence. Grandma warned me not to get too close; the wire would cut me and it would bleed and hurt, she admonished in her deep voice. I pulled my body back and kept my feet still until the food was spooned onto a hard plastic plate and a metal spoon placed beside it. Grandma fumbled in her money bag, the one tied around her waist, and came up with the correct coins. The Thai woman handed over the hot plate to my grandma through the fence, both of them careful of the heat and the sharp barbs.

We sat, Grandma on a rock and me on the hot ground, my dish of *khao pad* on my knees, and I ate while she stared at the misty gray mountains in the distance. They looked tall and fierce, full of creatures and magic. I wondered who lived on them. I knew that long ago, my family had lived on such mountains. I knew that my grandfather had been buried on such mountains. I knew that my grandmother had been born on such mountains. The mountains were our faraway, long-ago homes. I wondered if one day I would walk upon them. I wondered if I would fall from them, my feet only used to the flat of Ban Vinai and now the expanse of Phanat Nikhom. I wondered if my grandmother would ever return to them. But I didn’t ask her if she would. Somehow, I knew that the asking would make her sad.

I don’t remember us talking, Grandma and I, although I was a talkative child. I don’t remember her telling me stories, something she liked to do. Our time together in Phanat Nikhom was strange. The adults were busy trying to learn things they would need to know in America. How to say: “Hello. How are you? I am fine, thank you. Hello. Where is the restroom? Is it left? Is it right? O.K., thank you.” The children who went to school were busy, too. Dawb learned the alphabet and the different colors. She loved to say “yellow this” and “yellow that.” The younger children were
at the child care center learning to enjoy playtime and naptime, things that American children were taught to do. Grandma looked at the mountains silently, and I sat at her knees, at first busy with my food, and then later, with fear.

One of my uncles became sick, and was taken to the clinic. My mother and father took us to visit him. The room was crowded; there were hospital beds, some with curtains dividing them, others without. In the bed beside my uncle’s there was an old woman asleep. On her stomach was a plastic cover, and although the room felt cold to me, there were flies that flew around her sleeping form. My older cousins said her intestines were coming out. They said she was dying. I looked at her. She looked fat and perhaps if she were on her feet, tall. Her skin was a pale sort of unsteady gray. She was dying, and she scared me because I had seen deaths in Ban Vinai Refugee Camp. I could not make sense of the short time that a person was called sick and then called dying and then the sounds of the crying for the dead rising around the camp. I tried not to think about death, but it was impossible. I wanted my parents and Dawb and Grandma to live forever.

Please note: These questions are based on information from Passage 1

1. In paragraph 1, “The baskets were full of simple things like duck and chicken eggs, dark purple eggplants, deep-red banana blossoms, and bunches of pale-green watercress.” contains an example of
   A. imagery
   B. allusion
   C. characterization

2. In paragraph 2 admonished most nearly means
   A. wished
   B. cautioned
   C. berated

3. The main idea of this passage is
   A. Kao and her grandma had a special relationship
   B. khao pad was the best food in Phanat Nikhom
   C. there were many deaths in Phanat Nikhom
4. Which of the following was not an ingredient of *khao pad*?
   A. tomatoes
   B. cilantro
   C. onions

5. The mountains are used as a symbol for
   A. the past/what was
   B. her grandma/comfort
   C. food/desire
Appendix E
Post Assessment 11th and 12th

Reading Test — Segment 2

Read this article about calories. Then answer the questions. Some questions may ask you about certain paragraphs. The paragraphs are numbered on the left side.

The Calorie
written for the
Minnesota Department of Education

How Much Potential Energy Can You Burn?

1 Although we use the word “calorie” quite frequently, how many of us can explain what a calorie actually is? Simply put, a calorie can be defined as the amount of energy required to raise the temperature of one gram of water one degree Celsius, or 1.8 degrees Fahrenheit. So when we ask how many calories are in a slice of bread, we are really asking how much potential energy is contained in the bread. Calories are crucial to human health. Like a cell phone that needs recharging periodically, our bodies require energy to function. Without sufficient calories in our bodies, our hearts would cease to pump, our muscles would deteriorate, and our brains would not be able to process information.

2 So why are calories often considered to be negative things that should be avoided? The answer can be found not in the calorie itself, but rather in the number of calories we put into our bodies. Most adults require 1,000 to 1,400 calories just to keep their body systems functioning properly. The minimum number of calories is referred to as the resting metabolic rate (RMR), a variable number that is dependent on age, gender, and muscle mass. However, because we do not just rest all day, we need more than this minimal amount of energy to climb stairs, play basketball, or engage in other physical activity. For most adults, this means an additional 400 to 600 calories per day.

3 Gaining one pound of fat takes more than 3,500 calories. If adults consume approximately 2,000 calories daily, they will maintain their current weight. However, if they consume an additional 500 calories daily, they will gain one pound in one week. Those additional 500 calories can come from merely eating several handfuls of nuts or sampling a few extra cookies.

4 To lose weight, we have to burn more calories than we take into our bodies, a process accomplished by reducing our caloric intake or by burning calories through exercise. Combining a balanced caloric intake with exercise is the answer to keeping weight under control.

5 Does it matter what types of food we eat to reach our recommended daily requirement of calories? A calorie is a calorie, regardless of whether it comes from protein, fat, or carbohydrates. People will lose weight if they burn more calories than they need and gain weight if they eat more calories than their bodies require. For a balanced and healthy diet, however, carbohydrate and protein calories are more nutritionally...
acceptable than fat calories. An excess of fat calories can have serious negative health effects.

**How Many Calories Should a Teenager Consume Daily?**

6 Just as cars come in all sizes and shapes and require different amounts of gasoline, each teenager's body burns calories at a different rate. As teens grow, they require more fuel, especially if they exercise for more than one hour a day. Everyone has unique caloric requirements; large discrepancies, therefore, exist among organizations that publish dietary caloric intake charts. Registered dietitians can certainly help individuals learn what caloric intake is right for them.

7 One of the reasons people consume more calories than they need is because of portion size. A portion is the amount of food that we normally serve ourselves, while a serving size is the recommended amount of food. For example, the information on a box of cereal may indicate that three-fourths of a cup of cereal contains 90 calories. Since people often pay no attention to the serving size, they are unaware of how many calories they are consuming. As many as 150 calories are in a serving of fourteen potato chips. Think of the total number of calories a person takes in when devouring an entire bag of potato chips! Brian Wansink, PhD, a Cornell University professor and researcher, has found that when packages, plates, glasses, and spoons are larger, we tend to eat and drink more by increasing our portions. Since 1960, our plates and bowls have grown by 36 percent. Restaurant portions have doubled or even tripled from what they used to be.

8 To reduce portion size, we can estimate the quantity by using some simple references. A cup of cereal or strawberries is roughly the size of a baseball or a person's fist. A four-ounce piece of uncooked meat is the size of the palm of a person's hand or a hockey puck. One teaspoon of sugar is equivalent to the size of a small marble or the tip of a person's thumb. Portion size is important when determining daily caloric intake.

9 People should also pay attention to those foods that have large amounts of calories. Many fast-food meals average more than 800 calories, with some containing as many as 1,500 calories. Just one meal can exceed the recommended daily caloric intake for an adult, especially for people with sedentary or inactive lifestyles.

10 So, are calories friends or foes? They give us the energy to perform countless tasks. Nevertheless, our nutritional choices also play a valuable role in the quality of our health. The key is to develop and maintain healthy eating habits throughout our lives so that our bodies will continue to operate efficiently for a long, long time.
8. The author's most likely purpose for writing this article was to
   A. explain a way to safely lose weight.
   B. recommend certain foods over others.
   C. give readers a basic understanding of the calorie.
   D. help readers determine their ideal caloric intakes.

9. Read this sentence from paragraph 1.

   Without sufficient calories in our bodies, our hearts would cease to pump, our muscles would deteriorate, and our brains would not be able to process information.

   What does the word deteriorate mean?
   A. Cause pain
   B. Become weak
   C. Work even harder
   D. Use available nourishment

10. Why does the author define “calorie” in the first sentence of paragraph 1?
   A. To explain how water is affected by calories
   B. To describe the many uses of calories
   C. To establish the fact that food contains calories
   D. To promote a discussion about calories

11. What is the author's underlying argument in the article?
   A. Meals with many calories are unhealthy.
   B. Each teenager has different nutritional needs.
   C. People should try to develop healthy eating habits.
   D. Active people can eat more than those who avoid exercise.
12. According to the article, serving size is most closely related to
   A. identifying foods high in calories.
   B. obtaining energy from calories.
   C. controlling intake of calories.
   D. exercising to burn calories.

13. Based on paragraph 7, readers can conclude that people today
   A. eat out more than they did many years ago.
   B. understand the nutritional value of calories.
   C. find serving size recommendations useful.
   D. eat more than they did many years ago.

14. The author keeps the language of the article from becoming too technical by
   A. using many examples.
   B. defining key terms.
   C. mentioning a study.
   D. discussing caloric intake.

15. Read this sentence from paragraph 7.

   Think of the total number of calories a person takes in when devouring an entire bag of potato chips!

   Based on paragraph 7, the word devouring suggests eating that is
   A. messy.
   B. uncontrolled.
   C. unsatisfying.
   D. enjoyable.
16. Which statement from the article supports the idea that people who want to avoid gaining weight must pay attention to how they eat?
   A. “Those additional 500 calories can come from merely eating several handfuls of nuts or sampling a few extra cookies.” (paragraph 3)
   B. “An excess of fat calories can have serious negative health effects.” (paragraph 5)
   C. “Registered dieticians can certainly help individuals learn what caloric intake is right for them.” (paragraph 6)
   D. “Since 1960, our plates and bowls have grown by 36 percent.” (paragraph 7)
Appendix F
Vocabulary list Before Flashcard+

Anthem Vocabulary Chapter 1

1. **transgression** – n. a violation of a law, command, or duty; the exceeding of due bounds or limits
2. **portal** – n. a doorway, entrance, or gate, especially one that is large and imposing
3. **mandate** – n. an authoritative command or instruction; a command or authorization given by a political electorate or its representatives
4. **dais** – n. a raised platform, as in a lecture hall, for speakers or honored guests
5. **atone** – v. to make amends, as for a sin or fault
6. **pulpit** – n. an elevated platform, lectern, or stand used in preaching or conducting a religious service
7. **cesspool** – n. a covered hole or pit for receiving drainage or sewage, as from a house
8. **brigade** – n. a group of persons organized for a purpose
9. **convulsion** – n. an intense, involuntary muscular contraction; an uncontrolled fit
10. **wretch** – n. a person regarded as base, mean, or despicable; a miserable, unfortunate, or unhappy person

Anthem Vocabulary Chapter 2-3

1. **spangle** – n. a small, often circular piece of sparkling metal or plastic, sewn especially on garments for decoration; a small sparkling object, drop, or spot
2. **deign** – v. to think it appropriate to one’s station or dignity; condescend
3. **taut** – adj. pulled or drawn tight; emotionally or mentally strained or tense
4. **lassitude** – n. a state or feeling of weariness, diminished energy, or listlessness
5. **eugenics** – n. the study of generational improvement of the human race by controlled selective breeding
6. **avert** – v. to turn away
7. **fraternity** – n. a group of people associated for a common purpose or interest; the quality or condition of being brothers; brotherliness
8. **pyre** – n. a heap of burnable material, especially for burning a corpse as a funeral rite
9. **brine** – n. water filled with a large amount of salt; salt water used for preserving and pickling foods
10. **lodestone** – n. a piece of magnetite that has magnetic properties and attracts iron or steel
Appendix G
Vocabulary list after Flashcard+

Latehomecomer Vocab 1

Extirpate – v - To remove or destroy totally
Gnawing – n - Consistent, dull pains
Futile – adj - Ineffective; useless
Haughty – adj - Snobbish; stuck up
Suffused – v - To overspread with or as with a liquid
Lamented – v - Mourned for, as a person who is dead
Jostling – v - To bump, push, shove, brush against, or elbow roughly or rudely
Cacophony – n - Harsh discordance of sound; dissonance
Compound – n - An enclosure
Forage – v - To wander or go in search of provisions

Latehomecomer Vocab 2

Corrugated – v - To draw or bend into folds or alternate furrows and ridges
Discreetly – adv - Maintaining silence about something of a delicate nature
Encroaching – v - To advance beyond proper or usual limits
Translucent – adj - Permitting light to pass through but diffusing it so that persons, objects can see
Resonate – v - To reverberate; to be understood or receive a sympathetic response
Concoctions – n - A mixture of various ingredients or elements
Formidable – adj - Something that causes fear, apprehension, or dread
Girth – n - The circumference of an object
Ragtag – adj - Made up of mixed, diverse elements
Monsoon - n - The seasonal wind of the Indian Ocean and southern Asia
Appendix H
Student Reflections

Student Reflection

Date

- What type of reading strategies did you use today?
  - Story Mapping
  - Annotating the text- marking the text AVID style
  - Annotating the text- marking the text using pictures
  - Vocabulary building
  - Reading along while the text was read aloud to me
  - Checking understanding via self-assessing questions
  - Other

- Rate your level of understanding of the strategy overall.
  - 1- I did not understand what was going on
  - 5- I understand how to use this strategy completely and I am a pro at it.

- Rate how the reading strategy we used to day helped you interpret the assigned reading.
  - 1- I have no idea what the main idea of that reading was about.
  - 5- I am very confident that I understand the main idea of the reading

- How likely would you use this strategy on your own in the future?
  - 1- I will never use it.
  - 5- I really liked it and I will use all the time when I am trying to read for understanding.

- What else would you like to share about this reading strategy if any?
Appendix I
Teacher Reflections

Teacher Reflection

Date

- What type of reading strategies did you use today?
- Rate how you felt the students understood the reading strategy that was used today.
  o 1: They did not understand what was going on
  o 5: They understood how to use this strategy completely and they are now pro at it.
- Rate how the reading strategy helped the students understand the assigned reading.
  o 1: They had no idea what the main idea of that reading was about.
  o 5: They were able to pull out the main ideas from the reading and discuss what the main ideas meant.
- What else would you like to share about this reading strategy or how the day went?
Appendix J

Pre-Assessment versus Post-Assessment Data

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17M/16F 18SPED 3.7mean 3.7mean 4/11/2/12/21 11/9/8/8/7

*33 students have scores for both tests: 20 Sophs & 13 Frosh
*16 of 33 total are female/8 of 18 SPED are female
*question 5 on the pre-test was a vocab based question & 1 was main idea
*question 2 on the post-test was a vocab based question & 3 was main idea
*students went from 64% getting the vocab question wrong to 27%
*students went from 12% getting the main idea question wrong to 24%
*9 students saw an increase in score
*6 students saw a decrease in score
*the mean score was exactly the same for both the pre and post
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30M/11F 22SPED 5.5mean 5.6mean x=correct x=correct x=correct x=correct