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The Effectiveness of Cooperative Learning in the Reading Classroom

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Abstract

This research examined the effectiveness of specific methods of cooperative learning on reading comprehension, motivation, and attitudes. The study implemented Collaborative Strategic Reading (CSR) and the Jigsaw method in a rural public elementary school and included 60 participants from 3rd grade reading classes. One group used the CSR method to read information on four different topics while the other group read information on the same topics using the Jigsaw method. After controlling for initial attitudes, motivation, and global reading comprehension, the results indicated that neither of these methods led to greater gains in these areas than the other. However, when controlling for prior knowledge on the four specific topics, the CSR group made significant gains on all four posttests while the Jigsaw group only made significant gains on the first two tests. This suggests that the benefits of Jigsaw method may fade long term while CSR benefits may persist.

Cooperative Learning Versus Traditional Instruction

While cooperative learning is commonly used in the classroom today, it is very different from traditional whole-group instructional methods. Teachers in more traditionally structured classrooms often lead their students in whole group lessons and then give students individual assignments based on the material. Cooperative learning methods, on the other hand, focus on critical thinking, drawing conclusions, and real world application. In a cooperative learning setting, the teacher would typically act as a facilitator. As students work together in groups, they learn material through discovery and critical thinking, while the teacher guides them in the process. Through cooperative learning, students are encouraged to think critically and learn on their own with assistance from the teacher, rather than being told specifically what they need to know. Cooperative learning is becoming more and more common in the classroom because it is believed to have positive effects on student achievement, attitudes, and social abilities.

Effect on Achievement

In many situations across various age groups and settings, cooperative learning has been found to positively affect student achievement. In a meta-analysis of 26 studies, cooperative learning was consistently found to be significantly more effective than traditional methods (Capar & Tarim, 2015). To examine the effectiveness of the method across many age groups, the 26 studies chosen examined cooperative learning instruction on students in pre-k through university age. Although students in these various age groups may learn

differently and have different abilities, results still favored cooperative learning across the board.

When conducting research on preschoolers' problem solving skills in mathematics, Tarim (2009) found that the experimental cooperative learning groups showed significantly higher achievement on the post-test than did the control group when controlling for pre-test scores. In a similar study on 4th grade students learning about the Earth and sky, Celikten, Ipekcioglu, Ertepinar, and Geban (2012) found conceptual change oriented cooperative learning to lead to significantly higher achievement than traditional methods as well. This type of cooperative learning also allowed the 4th grade students to actively process information and refute misconceptions more effectively than traditional instruction. In yet another study, which utilized a program called Cooperative Integrated Reading and Composition (CIRC), students in grades two through six in the cooperative learning group were found to have significantly higher standardized results on reading vocabulary, reading comprehension, and language expression than their traditionally instructed peers (Stevens & Slavin, 1995).

Many similar studies have compared cooperative learning to traditional instructional strategies in various grade levels, and many have had similar results. For example, in a study by Atta, Jamil, Kundi, and Siddiques (2013) on 8th grade students, post-test scores from the experimental and control groups were analyzed and showed significantly greater achievement when cooperative learning methods were implemented. When looking at this study from a qualitative approach, it was suggested that this higher level of success in cooperative learning may be due to the teachers' opportunity to give all of the

students in the class more individual attention as they work. This opportunity is not as prevalent in a traditional setting in which the teacher spends a majority of the time instructing the class as a whole.

While studies typically point to cooperative learning success over traditional instruction, there are some exceptions. In a study on 7th grade students by Sears and Reagin (2013), cooperative learning was examined with task complexity as a factor. Of the two control groups they studied, one was an average math class while the other was an accelerated math class. They also had three experimental groups made up of two average math classes and one accelerated math class. This was done to examine if cooperative learning is as effective among accelerated students. When examining the pre-test and post-test, it was found that on-level students in the experimental group performed significantly better than their counter-parts in the control group. However, when looking at the two accelerated groups, the control group performed significantly better than the experimental group. This showed that for the accelerated students, who were capable of successfully solving the problems alone, cooperative problem solving became more of a hindrance. More research on the effect cooperative learning has on achievement in relation to students' academic abilities could be beneficial in determining if cooperative learning is as effective for all students.

Effect on Attitudes

It is logical that the degree to which a student's sense of achievement is important to himself or herself may affect their motivation and in turn their success (Tsay & Brady, 2010). Many research studies not only look at the impact cooperative learning has on achievement, but also its impact on

students' attitudes and self-concepts towards learning. When looking specifically at a variety of studies about cooperative learning and its impact on students' attitudes toward mathematics, the effect size was low (Capar & Tarim, 2015). It was suggested that these non-conclusive results could be due to the fact that many of the studies examined in the meta-analysis were less than 5 weeks and perhaps longer studies would have produced different results.

A study on cooperative learning involving 5th graders by Nawaz, Hussain, Abbas, and Javed (2014), which lasted over 7 weeks, may support this idea, as its results were significant. The study not only found significantly higher academic achievement for the cooperative learning group, but also found significantly higher results when examining students' academic self-concept in the cooperative learning group. This study used a pre-test and post-test self-concept questionnaire to gauge the students' academic self-concept, which resulted in significantly better self-concept among the cooperative learning group.

In another cooperative learning study by Lin, Chen, Yang, Xiet, and Lin (2014), fourth-grade students were interviewed qualitatively about their experiences with cooperative learning compared to traditional learning. In these interviews, it appeared as if students' attitudes toward cooperative learning were very positive in comparison to traditional methods as they made comments about enjoying working in teams and learning from one another better than completing individual assignments. When the Jigsaw II method of cooperative learning was studied by Shaaban (2006), fifth-grade reading students in the experimental group did not show any significant academic gain, but were found to have significantly higher perceptions of the value of reading, self-

concepts, and overall motivation. However, in Stevens and Slavin's (1995) study, which showed significant academic gain in reading and language arts, the second through sixth grade students in the cooperative learning treatment group were not found to have any significant difference in attitude when examining the results of their pre-test and post-test questionnaires.

As is evident, there has been a variety of studies conducted in relation to students' attitudes about and self-concepts after cooperative learning. Although no studies have pointed toward negative or decreased attitudes or self-concepts in response to cooperative learning, there also is not a great quantity of evidence pointed toward significantly higher attitudes or self-concepts. Therefore, although it seems safe to draw the conclusion that cooperative learning does not have a negative effect, more research may be necessary to determine if the method truly leads to higher self-concepts among students.

Effect on Social Abilities

Cooperative learning has also been recognized for being a pedagogical practice that promotes socialization among students of all ages (Gillies, 2014). Johnson and Johnson (2000) argue that there is no other pedagogical practice that promotes inter-personal relationships among students in the way that cooperative learning does. While it is difficult to quantitatively measure students' social interactions and abilities, this can be done qualitatively. Many researchers argue for the positive effects that cooperative learning has on students' social interactions and engagement (Ebrahim, 2010).

In Tarim's (2009) study on cooperative learning, preschoolers' abilities to cooperate, share, listen, and participate

were observed from the beginning to the end, and compared between the experimental and control groups. When the study began, students in the cooperative learning groups were hesitant and often refused to share their materials with others. However, by the end of the 10-week study, the students were sharing more willingly and using words like please and thank you more frequently. It was also observed that the active listening skills, which were emphasized to the cooperative learning group, began to improve students' abilities to cooperate with one another. For example, when the process began, the teacher had much more difficulty gaining the children's attention while explaining instructions and distributing materials than at the end. When students began the cooperative learning, they all wanted to participate but had trouble deciding who would play which role as they all had certain things they wanted to do. However, by the end students began to consider ways to fairly distribute the participation roles within the group.

In addition to social skills when working with one another, a qualitative study by Zsoldos-Marchis (2014), examined students' help-seeking strategies. In the experimental cooperative learning group it was observed that students did not feel strong individual control and therefore were more willing to ask questions of their group members when they did not know what to do. Students in the control group, on the other hand, were more likely to give up if they encountered a problem that they did not understand. This same idea was supported in a study by Peterson (1991) which compared females and males during cooperative learning. Although Peterson hypothesized that males would be more vocal and take leadership roles within groups, the results showed very few differences between males and females. However, when comparing the

cooperative learning groups to individualistic effort, it was found that participants in the cooperative learning group, regardless of gender, were much more likely to persevere when solving problems leading to greater success.

Methods of Cooperative Learning

There are many approaches to cooperative learning such as discovery and inquiry-based learning. Johnson and Johnson (2000) also listed shared learning, academic conflict, student group achievements, team-game tournaments, group research, jigsaw, and cooperation integrated reading and writing techniques as eight cooperative learning techniques. While most studies simply compare cooperative learning in general to traditional instructional techniques, some have analyzed the different methods of cooperative learning in relation to one another. In Capar and Tarim's (2015) meta-analysis, it was discovered that shared learning and unstructured techniques were the most effective. However, there are limited studies that compare these techniques to one another.

There are many methods of cooperative learning, but studies on cooperative learning in general do not always specify a particular cooperative learning method. However, many studies, which typically involve a control and experimental group, conclude that academic achievement is significantly higher in the cooperative learning group than the traditional instruction group. The conclusion that cooperative learning leads to significantly higher achievement may be misleading when a specific method is not being employed. While many studies over several decades find cooperative learning as an effective pedagogical tool (Tsay & Brady, 2010), the degree of significant difference in

achievement between cooperative learning and traditional methods also often varies in relation to the cooperative learning technique that is used.

In a study by Murtono (2015), various cooperative learning methods were used to teach reading comprehension to 5th grade students. This study found the Cooperative Integrated Reading and Composition (CIRC) model, which requires students to work in mixed-ability teams of four to read and discuss their reading, to be more effective than both the Jigsaw and Student Teams-Achievement Division (STAD) method. Like the CIRC model, the STAD method involves student working in mixed ability groups of four. However, the STAD in the method, students work together to make sure that all team members have mastered a teacher-presented lesson and then they take individual quizzes. While the CIRC model led to significantly higher results, there was no significant difference between the Jigsaw and STAD models. This shows that, once researchers begin examining more specific methods of cooperative learning, the results vary more. Therefore, it could be concluded that further research comparing specific methods of cooperative learning could be enlightening. Two cooperative learning models commonly used in public school environments are the jigsaw method and collaborative strategic reading. For this study, these were chosen as the two types of collaborative learning strategies to be tested due to their wide use and the existing, yet incomplete, body of research on each.

Jigsaw

Using the jigsaw method, students in a group each take responsibility for learning one aspect of a topic (Mengduo & Xiaoling, 2010). They research this aspect of a topic on their own and then join members of other groups who were researching the same topic. They work with this group to come up with the main ideas on their aspect. Then, each person in the original group shares what they learned so that the whole group is taught about each aspect of the topic. In a study with a pre-test/post-test design, the jigsaw method was used to teach a 6th grade science unit on chemical and physical changes (Tarhan, Ayyildiz, Ogunc, & Sesen, 2013). This study showed significantly higher achievement for the jigsaw group than for the control. Students in the jigsaw experimental group also were found to have a lower proportion of misconceptions related to the science material than those in the control group who were taught through traditional instruction. This suggests that the jigsaw method of cooperative learning may be effective in challenging student misconceptions. In Apostol's (2013) study, 7th grade students used the jigsaw method to research King Henry VIII. In this qualitative study, it was found that the jigsaw method developed students' communication and interaction skills.

In a study, which was conducted in a college level English as a Foreign Language (EFL) course, the jigsaw method was found to be significantly more effective than traditional approaches to teaching reading (Meng, 2010). In Mengduo and Xiaoling's (2010), study similar results were found in a different college-level EFL course. In this study, researchers found that the jigsaw method was effective in encouraging both participation and enthusiasm. Both of these studies show is that the jigsaw method may be effective across various age ranges and with EFL students in particular.

Alternatively, when the jigsaw method was used in a 5th grade reading classroom it was not found to be significantly more effective than whole group instruction

(Shaaban, 2006). However, traditional instruction was not found to be significantly more effective than the jigsaw method either. In Souvignier and Kronenberger's (2007) study, 3rd grade participants learned math and science through the jigsaw method. The higher achievement of the cooperative learning jigsaw group was minimal and not found to be significant. When the jigsaw method was analyzed qualitatively, however, there did seem to be some advantages over teacher-guided instruction as far as social skills and students' self-concepts. This being said, the jigsaw method was found to be just as successful as traditional instruction but was not significantly higher as might have been predicted. These studies show that there is some inconsistency between studies on the effectiveness that the jigsaw method has on student achievement.

Collaborative Strategic Reading

Collaborative Strategic Reading is a cooperative learning strategy in which students in a group work together with each student having a specific job. This method lays out specific previewing, reading, and wrap-up strategies and gives each member of the group a role. For example, roles involve responsibilities such as summarizing main ideas, asking questions, keeping time, and reporting findings. In a study on Collaborative Strategic Reading, McCown and Thomason (2014) found that students in the experimental group made significantly greater gains in comprehension, according to the Gates-MacGinitie Reading Test, than those in the control group. However, there was not a significant difference between the experimental and control groups when examining the students' total CRCT reading scores. There was also no significant difference on students' meta-cognitive awareness when measured using the Metacognitive Awareness of Reading Strategies Inventory (MARSI). As is evident, the effectiveness of the CSR method appeared different depending on the type of post-test being used.

In another study, the CSR method of reading instruction was used twice a week, once in social studies and once in science, for the Full CSR experimental group (Boardman, Klingner, Buckley, Annamma, & Lasser, 2015). Another experimental group, the Partial CSR group received CSR only once a week, and the control group was never instructed through the CSR method. This study resulted in Full CSR students significantly out-performing those in the Partial CSR condition as well as the control group. The Partial CSR group did not show any significant gains over the control group. While the Partial CSR group in this study was unintentional due to scheduling conflicts, this could suggest that the frequency of implementation of the CSR method has an effect on student gains.

In Vaughn, Klinger, and Bryant's (2001) study on Collaborative Strategic Reading, students in the CSR group were found to have made significant gains in word identification, reading fluency, and reading comprehension. However, when the same study specifically examined a subgroup of very low readers, there were very little to no gains in word identification, reading fluency, and reading comprehension. This suggests that the CSR method may be more effective for students who are on level than those who are behind. However, in a study focusing on students in special education classes, students with learning disabilities who were in the CSR group made significantly greater gains than those who were not instructed using CSR (Boardman et al., 2016). This finding indicates that students with special needs may benefit from CSR instruction.

Summary of Findings

While a great deal of research has been conducted on cooperative learning, there are many gaps that still need to be filled. Many studies compare cooperative learning to traditional instruction but fail to be specific about exactly what method of cooperative learning is being used. When examining these studies, it seems as if the majority are not very specific about the method of cooperative learning. These studies consistently find cooperative learning to be more successful than traditional instruction. However, it is important to realize that those conclusions are generalized and may not actually apply to all methods of cooperative learning. For example, when studies were conducted on the jigsaw method of cooperative learning in particular, the results were more inconclusive. This being said, there are relatively few findings that compare the varying methods of cooperative learning. This makes it difficult to determine in which circumstances it is truly successful.

Research Questions

This study was designed to test the effectiveness of cooperative learning techniques when used in the 3rd grade-reading classroom. Many studies have been conducted on cooperative learning, including some regarding reading which, for the most part, support it as a valid educational method (Capar & Tarim, 2015; Tsay & Brady, 2010). Studies have suggested that cooperative learning improves students' abilities to work with one another (Gillies, 2014; Johnson & Johnson, 2000) and solve complex problems (Capar & Tarim, 2015; Celikten et al., 2012; Tarim, 2009) and promotes gains in self-confidence (Nawaz et al., 2014; Tsay & Brady, 2010). These skills in turn should improve students' achievement in reading and should be evident in a post-test as well as in their daily grades. However, few studies have compared various cooperative learning methods.

This study examined if the Jigsaw method or the Collaborative Strategic Reading (CSR) method of cooperative problem solving would result in higher reading achievement among 3rd grade reading students. The first question was whether the jigsaw method of cooperative learning or Collaborative Strategic Reading would be more effective in regard to reading comprehension. The study examined the effects of each method on overall reading comprehension as well as text-specific comprehension. Of these two methods of cooperative learning, would one result in more positive attitudes and higher motivation among reading students than the other? Due to more consistent research results on the CSR method, it was predicted that the CSR group may score higher on the posttests.

Method

Participants

The study was conducted at a public elementary school in Dawsonville, Georgia. It is a rural, Title 1 school with approximately 375 students from Kindergarten through 5th grade. The racial demographics of the student body were 79.6% White, 17.4% Latino, .5% African American, and 2.5% other. Of these students, 51% were considered economically disadvantaged as defined by free and reduced lunch rates, and 10% were enrolled in special education services.

The participants in the study on the effects of Jigsaw compared to CSR cooperative learning were 3rd grade students, ages 8 and 9, from three different reading

classes. The racial demographics of the 3rd grade were similar to that of the school as a whole. There was a combination of English Language Learners, below level, on level, and advanced students participating in the study. Out of 60 third grade-reading students, two were considered gifted readers. One gifted reader was instructed using CRS and the other using Jigsaw. Every third grade student in the school, other than a few who took a resource reading class as a part of their special education services, took the same reading class for 45 minutes each day.

These three classes were used to create seven Jigsaw groups and six CSR groups. Each of these groups was comprised of four or five students with a total of 29 students using CSR and 31 students using Jigsaw. For these groups to be created one whole class period was made of up solely of students doing Jigsaw, another class period was only CSR, and the third class period was 3 groups engaged in Jigsaw and two groups engaged in CSR.

Materials and Measures

Reading materials. Both the jigsaw and the Collaborative Strategic Reading groups used the same reading materials to complete reading assignments. There were four different reading topics: deserts, giraffes, Rosa Parks, and recycling. Each of these topics had different reading resources including informational books as well as articles. The articles were 1-3 pages in length while the books were each approximately 20-40 pages. All books and articles ranged in Lexile levels from 350 to 750. A list of these books and articles can be found in Appendix A. There were four or five different groups per class period. Each of these groups worked on the cooperative learning assignments three days each week. Therefore, the resources stayed in the

classroom to be used with each class. This way, the students in a group completing an assignment using the jigsaw method used the same materials as a group in another class period that was completing the assignment using Collaborative Strategic Reading.

Student motivation. The Motivation for Reading Questionnaire (MRQ), created by Meng and Guthrie (1997), was used to measure students' motivation in regard to reading both as a pre-assessment the week before and as a post-assessment at the end of the study. This questionnaire was scored on a 4-point Likert scale and comprised of 54 items. The Likert scale item answers ranged from "Very different from me" to "A lot like me". The 54 items were divided into 11 constructs: Reading Efficacy, Reading Challenge, Reading Curiosity, Reading Involvement, Importance of Reading, Reading Work Avoidance, Competition in Reading, Recognition for Reading, Reading for Grades, Social Reasons for Reading, and Compliance. For the purpose of this study, overall motivation was analyzed as well as the Reading Efficacy and Social Reasons for Reading constructs. These constructs were chosen because previous research has suggested that cooperative learning may specifically enhance students' attributes in these areas. Wigfield and Guthrie (1997) reported reliability for the Work Avoidance and Reading for Grades to be .44 and .43 respectively. However, at another point in time, these constructs were found to have reliabilities of .60 and .59. The other nine constructs were found to have reliabilities, which consistently ranged from .52 to .81. The Reading Efficacy construct was found to have a reliability of .63 and .68 and the Social Reasons for Reading had a reliability of .72 and .78. The MRQ can be found in Appendix B.

Student attitudes. The Attitudes Toward Mathematics Inventory created by Martha Tapia (1996) was altered by replacing the word "mathematics" with "reading" in order to measure student attitudes toward reading. This inventory is composed of 40 items, which were scored according to a 5-point Likert scale. The item answers ranged from "Strongly Disagree" to "Strongly Agree". Using the SAS package of Cronbach's alpha, the reliability of this inventory was determined to be .97. The Attitudes Toward Mathematics Inventory can be found in Appendix C.

Student achievement. Students' overall reading Lexile levels were measured before and after the study using the Scholastic Reading Inventory (SRI). The SRI is a computerized test which measures student Lexile levels based on students' ability to answer multiple-choice questions on various leveled reading passages. Lexile levels are generated based on students' ability to comprehend the reading passages and choose the correct multiple-choice answer. The passages in the assessment were taken from both informational and literary authentic texts.

In addition, students were given a pretest and posttest on each specific topic every two weeks for a total of eight weeks. This resulted in student test scores for each of the four topics that can be compared between methods. These tests were teacher-created and were made up of 8 multiple choice questions and 2 short answer questions that required only 1-2 sentence responses. All questions pertained to the reading materials. The questions were made to include knowledge of information from each source used on the topic and from each aspect of the topic which students were required to gather information on. The tests associated with each topic can be found in Appendix D.

Procedures

While participating in this study, students began studying informational texts in cooperative learning groups. The seven-week unit was used primarily to help students develop comprehension skills in regard to informational texts. Each of the three reading classes was divided into four or five groups with four or five students in each group. Students worked in these groups for 45 minutes, 3 days a week throughout the seven-week period. There were four different topics that the groups worked on one at a time. Students spent a total of five days on each of the four topics. On the first day of each five-day cycle, students took a pretest on their group's topic. Each topic had two books and two reading passages or articles to accompany it. These resources stayed in the room so that students in CSR groups used the same materials as students in jigsaw groups. After five days of working with the selected reading materials for a topic, filling out guided summary sheets, and taking a text specific posttest, the groups switched to another topic and repeated the process until they had completed all four topics.

Jigsaw group. Students who were learning through the jigsaw method were in groups of either four or five. These groups were arranged according to previous Lexile level measures to ensure that students with lower Lexile levels were placed in groups with students of higher Lexile levels. Each jigsaw group was studying Rosa Parks, giraffes, deserts, and recycling. The groups studied the same topic every other day until they had spent five days on the topic. They then moved on to the next topic until all four topics had been covered.

After being assigned a group, the students in each group were each assigned a particular aspect of the topic that they are

responsible for. For example, students in a group studying Rosa Parks could be gathering information on her childhood, her role in the NAACP, her refusal to get off the bus, or her role in the bus boycott. They looked through the provided books and articles and took notes on information that they thought was important to their particular aspect.

After compiling this information, they met with students from other groups who were also researching that aspect. For example, all students who gathered information on Rosa Park's role in the bus boycott came together to form a new group. Together, these groups discussed the information that they found. They then decided what information was important.

After these groups agreed on what information was essential, each student went back to his or her original heterogeneous group and shared this information. Once each member had shared their findings, the group compiled the information that they collected on the topic as a whole to fill out their summary sheet. Then, on the last day of the five-day cycle, all students were given a test on the topic. After this five-day period, the groups completed this process again with a new topic. The original groups stayed the same throughout the study. However, the secondary groups changed depending on what aspect of the topic a student was researching. Once the jigsaw process had been completed on each topic, the students took a text-specific post-test, which was the same as the pre-test that they took prior to completing any readings on the topic.

Collaborative strategic reading group. Collaborative Strategic Reading (CSR) is a four-step process, which is completed in groups of four or five. Each member of the group had a specific role in the process. The first step in the process was to preview the text for two to three minutes by having students look at the title, headings, graphics, bold words, underlined words, and any other key information. During this step, students were to be thinking about their background knowledge on the subject and perhaps making predictions. The previewing process was guided with a set of written instructions.

Next, the students entered the "click and clunk" phase in which the clicks refer to a paragraph or section they understood, and a clunk was when they came across a word or phrase that was unfamiliar or confusing. Once students identified clunks, they worked together to use strategies such as rereading, breaking apart, and identifying prefixes and suffixes to figure out what the word or phrase meant.

The third step was "getting the gist". To do this, students in the group read the text together and then talked about what information they thought was the most important. After looking at the details and important information students decided what the main idea of each section of the text was. As a group, they determined how to write out the main idea in their own words on their summary sheet.

The fourth and final step is the "wrap-up" in which students asked each other questions about what they learned and reviewed the important ideas. Students were instructed to develop thought-provoking questions that required more than a simple "yes" or "no" answer. These questions and the corresponding, agreed upon answers were also be listed on their summary sheet. During this time, the groups also discussed how well they worked as team throughout the process and ways they could improve.

The CSR groups completed this process for multiple texts associated with their topic and then used their compiled information from each session to review before taking the test on their topic. Throughout this whole process, members of each CSR group were each assigned a particular role within the group. The leader informed the group of what to read next, what strategy they would be using at different times, and when it was time to move on to the next step. The "clunk expert" was in charge of a list of clunk solving strategies and helping the group use these during the click and clunk phase. The announcer called on group members to read or share and made sure everyone participated without talking over one another. The reporter reviewed what the group learned through the process, summarized the main ideas and shared a question that the group generated. The encourager evaluated how well the group worked together, encouraged people to participate, and gave suggestions for improvement. If it was CSR group composed of only four members, the leader also took on the role of the announcer.

Once this process had been completed for one topic, the group would take the corresponding posttest and continue the process for the next topic. However, they had a different role within their group for each of the four topics to ensure that everyone experienced almost all of the responsibilities throughout the process. Then, after spending seven weeks total to go through the process for all four topics, the students took the SRI again to gather posttest Lexile level information.

Results

Disposition Measures

The first sets of analyses conducted were done by comparing the overall effects of the CSR group to the jigsaw group in order to determine if the results of one group were significantly different from the other. First, an ANCOVA analysis was conducted to compare student attitudes toward reading in the CSR group to the jigsaw group. The pretest scores on the Attitudes Toward Reading questionnaire were entered as the covariate to control for initial attitude and the posttest scores were entered as the dependent variable. When the CSR and jigsaw groups were compared there was no significant difference, $p = .827$.

Student motivation was analyzed through the same process. An ANCOVA analysis was conducted using the MRQ pretest as the covariate and the MRQ posttest as the dependent variable. These results also showed no significant difference between the CSR and jigsaw groups, $p = .423$. When the reading efficacy and social reasons for reading constructs of the MRQ were analyzed in the same manner separately, there was also no significant difference with $p = .476$ and $p = .129$ respectively.

Achievement Measures

Students' global reading comprehension was measured before and after the study using the Scholastic Reading Inventory, which determines their individual Lexile levels. When an ANCOVA analysis was conducted using the pre-test scores as the covariate and the posttest scores as the dependent variable, it was found that neither group significantly out-performed the other with $p = .861$.

Students' topic-specific reading comprehension in the CSR group and jigsaw group on the four topics were compared using an ANCOVA as well. The topic specific pretests were used as covariates and the posttests were used as the dependent variables. The first topic that students studied in their groups was Giraffes. The analysis comparing the groups' results on this topic showed no significant difference between the CSR and Jigsaw groups, $p = .429$. The second topic, Rosa Parks, also showed no significant difference in reading comprehension between the two groups, $p = .941$. The third topic, deserts, did result in the CSR groups preforming significantly higher than the jigsaw groups, $p = .010$. The fourth topic, recycling, like the first two cycles resulted in no significant difference between the two groups, $p = .637$. The results for the desert topic can be found in Tables 1 and 2 below.

Table 1
Descriptive Statistics for the Desert Topic

Group	N	M	SD
Jigsaw	29	69.31	21.37
CSR	30	77.00	15.57
Total	59	73.22	18.89

Table 2
ANCOVA Between-Subjects Effects Analysis on the Desert Topic

Source	df	F	p	partial eta squared
Corrected Model	2	6.413	.003	.186
Intercept	1	49.680	.000	.470
Desert	1	9.926	.003	.151
Group	1	7.014	.010	.111
Error	56			
Total	59			
Corrected Total	58			

Note. R Squared = .186 (Adjusted R Squared = .157)

The four topic-specific post-tests were also analyzed by cooperative learning strategy with an ANOVA to determine if there was significant growth from the pretest to the posttest. The first topic cycle, Giraffes, resulted in significantly higher scores on posttest for both the CSR group, $p < .001$ and for the jigsaw group, $p < .001$ (Tables 3, 4, 5, and 6).

Table 3
Descriptive Statistics for the CSR Giraffe Topic Pre and Post Tests

Group	N	M	SD
Pre	29	49.31	21.70
Post	29	84.83	17.03
Total	58	67.07	26.36

Table 4
ANOVA Between-Subjects Effects Analysis on CSR Giraffe Topic

Source	df	F	p	partial eta squared
Corrected Model	1	48.067	.000	.462
Intercept	1	685.597	.000	.924
Pre and Post	1	48.067	.000	.462
Error	56			
Total	58			
Corrected Total	57			

Note. R Squared = .462 (Adjusted R Squared = .452)

Table 5
Descriptive Statistics for the Jigsaw Giraffe Topic Pre and Post Tests

Group	N	M	SD
Pre	30	47.00	15.21
Post	30	87.00	10.55
Total	60	67.00	23.96

Table 6
ANOVA Between-Subjects Effects Analysis on Jigsaw Giraffe Topic

Source	df	F	p	partial eta squared
Corrected Model	1	141.176	.000	.709
Intercept	1	1584.353	.000	.965
Pre & Post	1	141.176	.000	.709
Error	58			
Total	60			
Corrected Total	59			

Note. R Squared = .709 (Adjusted R Squared = .704)

The same results were found on the second cycle topic, Rosa Parks, with the CSR group showing significant improvement, $p < .001$ (Tables 7 and 8), and the jigsaw group showing significant improvement, $p < .001$ (Table 9 and 10).

Table 7
Descriptive Statistics for the CSR Rosa Parks Topic Pre and Post Tests

Group	N	M	SD
Pre	30	41.67	18.95
Post	30	78.33	13.92
Total	60	60.00	24.77

Table 8
ANOVA Between-Subjects Effects Analysis on CSR Rosa Parks Topic

Source	df	F	p	partial eta squared
Corrected Model	1	72.952	.000	.557
Intercept	1	781.372	.000	.931
Pre & Post	1	72.952	.000	.557
Error	58			
Total	60			
Corrected Total	59			

Note. R Squared = .557 (Adjusted R Squared = .549)

Table 9
Descriptive Statistics for the Jigsaw Rosa Parks Topic Pre and Post Tests

Group	N	M	SD
Pre	29	46.55	19.32
Post	29	80.00	17.11
Total	58	63.28	24.74

Table 10
ANOVA Between-Subjects Effects Analysis on Jigsaw Rosa Parks Topic

Source	df	F	p	partial eta squared
Corrected Model	1	48.697	.000	.465
Intercept	1	697.096	.000	.926
Pre & Post	1	48.697	.000	.465
Error	56			
Total	58			
Corrected Total	57			

Note. R Squared = .465 (Adjusted R Squared = .456)

On the third topic cycle, deserts, the CSR group showed significant improvement, $p < .001$ (Tables 11 and 12), while the Jigsaw group did not show significant improvement, $p = .30$.

Table 11
Descriptive Statistics for the CSR Deserts Topic Pre and Post Tests

Group	N	M	SD
Pre	30	51.00	21.71
Post	30	77.00	15.57
Total	60	64.00	22.86

Table 12
ANOVA Between-Subjects Effects Analysis on CSR Deserts Topic

Source	df	F	p	partial eta squared
Corrected Model	1	28.412	.000	.329
Intercept	1	688.603	.000	.922
Pre & Post	1	28.412	.000	.329
Error	58			
Total	60			
Corrected Total	59			

Note. R Squared $= .329$ (Adjusted R Squared $= .317$)

The fourth cooperative learning cycle on recycling had similar results with the CSR group showing significant improvement, $p < .001$ (Tables 13 and 14), while jigsaw group did not show significant results, $p = .269$.

Table 13
Descriptive Statistics for the CSR Recycling Topic Pre and Post Tests

Group	N	M	SD
Pre	30	37.67	15.24
Post	30	62.67	20.67
Total	60	50.17	21.98

Table 14
ANOVA Between-Subjects Effects Analysis on CSR Recycling Topic

Source	df	F	p	partial eta squared
Corrected Model	1	28.434	.000	.329
Intercept	1	457.980	.000	.888
Pre & Post	1	28.434	.000	.329
Error	58			
Total	60			
Corrected Total	59			

Note. R Squared $= .329$ (Adjusted R Squared $= .317$)

Discussion

The purpose of this study was to investigate the effects of two different cooperative learning instructional strategies, jigsaw and CSR, on students' dispositional traits and achievement. The dispositional traits of interest were attitudes towards reading, motivation, efficacy, and social reasons. The achievement constructs of interest were global reading comprehension and topic-specific reading comprehension. By analyzing these effects, we had hoped to identify which of the approaches provided students with the most benefit.

The findings in regard to student attitudes and motivation did not show any significant difference between the two groups. This suggests that neither the CSR method nor then jigsaw method had an advantage over one another in improving student attitudes or motivation toward reading. This, however, does not mean that either method is ineffective in improving student motivation and attitudes. It simply shows that neither of the cooperative learning methods used was significantly more

effective than the other. In a study by Kheirandish and Kheirandish (2016) in which cooperative learning was examined in comparison to traditional instruction, the cooperative learning had a significantly more positive effect on student motivation.

Similar non-significant results were found when comparing the growth in global reading comprehension between the two groups. Although neither group showed significant gains over the other, this again does not mean that the cooperative learning methods were ineffective. In fact, the vast majority of students' Lexile levels were higher on the posttest than the pretest. This shows that both cooperative learning methods may be effective, even if one is not more effective than the other.

It was interesting that of the four cooperative learning cycles, the third cycle was the only one in which one group significantly out-performed the other. During this cycle, the CSR group's post-test scores showed significantly greater achievement than those of the jigsaw group. This perhaps could be explained by looking at the two types of groups' performances when they were analyzed separately using an ANOVA analysis. During the first two cycles both groups showed significant gains from the pretest to the posttest. However, on cycles 3 and 4 only the CSR group made significant gains while the jigsaw group did not show significant achievement gains. This could be due to the nature of the two types of cooperative learning. In the CSR group, students changed roles with each cycle. By changing roles with each new topic, the students in the CSR group were never repeating the process in the same way. This may have kept them more interested and engaged which could explain their continuous significant growth throughout the study. On the other hand, students in the

jigsaw group followed the exact same procedures throughout all four cycles. While the topics changed, these students followed the same steps each time. If students in the jigsaw group became bored with the process and were therefore less engaged, it is plausible that this could have caused their gains on the last two cycles not to be significant while the CSR group retained significant gains. It is also possible that the continued significant gains of the CSR group could be related to the reflection process that students engaged in at the end of each session. Discussing what they learned, problems they had, and ways they could improve as a group could have encouraged students to think about how they were preforming throughout the process each day. This reflection process, or group processing, was found to be effective in a study by Valkes, De Wever, Zhu, and Deed (2009). In another report by Bertucci, Johnson, and Johnson (2012), various studies using group processing in different ways were examined, and it was found to consistently lead to higher academic achievement. Therefore, it is also possible that the group processing aspect of the CSR instructional method could have influenced the continuous positive results that were not found in the last two cycles of the jigsaw method.

Limitations

The sample used in the study may have been a limitation for several, reasons. First, the sample size for the jigsaw group was 29 students and the sample size for the CSR group was 30 students. The participants for the study were a convenience sample, which involved the entire 3rd grade in the regular education classroom at the school. Therefore, the number of students involved in the study was relatively small, though sufficient for statistical analysis. Had the sample size been larger, it is possible that

some of the results could have been more pronounced. The demographics at the school were limited as well with the vast majority of the students being White and from a rural area and over half of the students being considered economically disadvantaged. This being said, the results may not be generalizable to populations with different demographics.

Another limitation to the study was the amount of time that the cooperative learning methods were practiced in the classroom. The methods were used for 45 minutes, three days a week for seven weeks. Had the study been over a longer time period, there is a chance that the results could have shown more substantial differences. Like any language process, reading is a developmental skill that takes relatively long periods of time to affect, in contrast to more discrete knowledge-based constructs that can be quickly devoted to memory and learned. Thus, seven weeks may not have been sufficient time for students to show significant growth in the area. For example, when analyzing the two groups' performances from pretest to posttest on the four topics, the CSR group showed significant growth for all four while the jigsaw group only had significant growth on the first two. If the study had been carried out for a longer period, it is possible that this trend could have continued, making the conclusions drawn stronger.
The study set-up with the researcher as the teacher may have also been a limitation. While both methods of cooperative learning were student-led with the teacher acting as a facilitator, the methods did have to first be taught to the students in order for them to know what to do. Had the study been carried out in more than one classroom with various teachers, the results also may have been more generalizable. While the methods involve specific procedures, different teachers may

have been able to instruct students on how to carry out the procedures more effectively. In addition, teacher experience and training in cooperative learning has been found to be correlated with higher student achievement when cooperative learning techniques are implemented (Saborit, Fernandez-Rio, Cecchini Estrada, Mendez-Gimenez, & Alonso, 2016).

Implications and Future Research

While neither the jigsaw nor CSR method was found to have a greater effect on global reading comprehension, attitudes, or motivation, there were some interesting findings when examining the topic-specific comprehension tests. During the first half of the study, both groups performed significantly better on the topic posttest than they did on the pretests. However, during the last half of the study, only the CSR group continued to perform significantly better on the tests while the jigsaw group did not. It would be beneficial to test these methods against one another for a period much longer than seven weeks. If the study were to be carried out for a year, this trend could be further analyzed. There is also a possibility that a longer study could show more substantial differences between the two methods in regard to the global comprehension, attitudes, and motivation.

In future research, it would also be beneficial to carry out the study with a larger and more diverse sample. For example, having 150 students instead of 60 students and several teachers participate in the study would provide more generalizable data. In future studies, it would also be beneficial to use a more diverse sample, including students from a wider variety of racial and socioeconomic backgrounds. While it is possible that the results would be similar with a more diverse sample, this would make the

results more generalizable to the greater population.

Conclusion

Cooperative learning is commonly used in a variety of educational settings. In this study, two forms of cooperative learning, jigsaw and CSR, both appeared to produce similar effects in regard to students' dispositions and global comprehension. However, findings suggest that CSR may have a more enduring impact over time, as the positive effects of jigsaw began to fade while CSR maintained its effectiveness. Continuing research on different methods of cooperative learning could be extremely useful in determining which methods may lead students to success. The methods tested in this study could be researched further in reading, as well as in a variety of other subject-areas. By researching specific cooperative learning methods in different settings, educators could gain a clearer picture of which methods are most effective, and the CSR approach may be one that holds great potential for student learning.

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Appendix A

Books:

Desert: Inside Australia's Simpson Desert by Meredith Hooper- 550L

Deserts by Holly Cefrey- 860L

Giraffes by Tracey Reeder- 550L

The Life of Rosa Parks by Cynthia Mercotti- 375L

Recycle! A Handbook for Kids by Gail Gibbons- 840L

Reading Passages/Articles:

Civil Rights Activists: Rosa Parks by Biography.com Editors and A+E Networks, adapted by Newsela staff- 530L

Deserts by ReadWorks- 570L

Great Giraffes by Linda Ruggieri- 640L

Meet Rosa Parks by Susan LaBella- 740L

Recycling and Conservation: Why Recycle by ReadWorks- 590L

Recycling: How it Works by ReadWorks- 720L

Study Finds Genes That May Explain Why Giraffes Have World's Longest Necks by Washington Post, adapted by Newela staff- 600:

What is a Desert? By Kate Paixao- 500L

Appendix B

The Motivation for Reading Questionnaire

School name: _____ Teacher name: _____

Student name: _____ Grade: _____ Date: _____

We are interested in your reading. The sentences in this questionnaire describe how some students feel about reading. Read each sentence and decide whether it describes a person who is like you or different from you. There are no right or wrong answers. We only want to know how you feel about reading. <u>For many of the statements, you should think about the kinds of things you read in your class.</u>

Here are two samples to try before we start on the ones about reading:

If the statement is **very different from you**, circle a 1.
If the statement is **a little different from you**, circle a 2.
If the statement is **a little like you,** circle a 3.
If the statement is **a lot like you**, circle a 4.

	Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
I like ice cream.	1	2	3	4

	Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me
I like spinach.	1	2	3	4

Okay, we are ready to start on the ones about reading. Remember, when you give your answers you should think about the things you are reading in your class. <u>There are no right or wrong answers. We just are interested in YOUR ideas about reading. To give your answer, circle ONE number on each line. The answer numbers are right next to each statement.</u>

Let's turn the page and start. <u>Please read each of the statements carefully, and then circle your answer</u>.

Remember: Read each sentence and decide whether it describes a person who is like you or different from you. There are no right or wrong answers.

	Very Different From Me	A Little Different From Me	A Little Like Me	A Lot Like Me				
	1	2	3	4				
1. I visit the library often with my family.					1	2	3	4
2. I like hard, challenging books.					1	2	3	4
3. I know that I will do well in reading next year.					1	2	3	4
4. I do as little schoolwork as possible in reading.					1	2	3	4
5. If the teacher discusses something interesting, I might read more about it.					1	2	3	4
6. I read because I have to.					1	2	3	4
7. I like it when the questions in books make me think.					1	2	3	4
8. I read about my hobbies to learn more about them.					1	2	3	4
9. I am a good reader.					1	2	3	4
10. I read stories about fantasy and make-believe.					1	2	3	4
11. I often read to my brother, sister, friend, or relative.					1	2	3	4
12. I like being the only one who knows an answer in something we read.					1	2	3	4
13. I read to learn new information about topics that interest me.					1	2	3	4
14. My friends sometimes tell me I am a good reader.					1	2	3	4
15. I learn more from reading than most students in the class.					1	2	3	4
16. I like to read about new things.					1	2	3	4
17. I like hearing the teacher say I read well.					1	2	3	4
18. I like being the best at reading.					1	2	3	4
19. I look forward to finding out my reading grade.					1	2	3	4

	Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4

20. I sometimes read to my mother or father.   1 2 3 4

21. My friends and I like to trade things to read.   1 2 3 4

22. It is important for me to see my name on a list of good readers.   1 2 3 4

23. I don't like reading something when the words are too difficult.   1 2 3 4

24. I make pictures in my mind when I read.   1 2 3 4

25. I always do my reading work exactly as the teacher wants it.   1 2 3 4

26. I usually learn difficult things by reading.   1 2 3 4

27. I don't like vocabulary questions.   1 2 3 4

28. Complicated stories are no fun to read.   1 2 3 4

29. I am happy when someone recognizes my reading.   1 2 3 4

30. I feel like I make friends with people in good books.   1 2 3 4

31. My mother or father often tells me what a good job I am doing in reading.   1 2 3 4

32. Finishing every reading assignment is very important to me.   1 2 3 4

33. I like mysteries.   1 2 3 4

34. I talk to my friends about what I am reading.   1 2 3 4

35. If I am reading about an interesting topic, I sometimes lose track of time.   1 2 3 4

36. I like to get compliments for my reading.   1 2 3 4

37. Grades are a good way to see how well you are doing in reading.   1 2 3 4

38. I like to help my friends with their schoolwork in reading.   1 2 3 4

39. I read to improve my grades.   1 2 3 4

40. My mother or father asks me about my reading grade.   1 2 3 4

Very Different From Me 1	A Little Different From Me 2	A Little Like Me 3	A Lot Like Me 4

41. I enjoy a long, involved story or fiction book.   1 2 3 4

42. I like to tell my family about what I am reading.   1 2 3 4

43. I try to get more answers right than my friends.   1 2 3 4

44. If the project is interesting, I can read difficult material.   1 2 3 4

45. I enjoy reading books about people in different countries.   1 2 3 4

46. I read a lot of adventure stories.   1 2 3 4

47. I always try to finish my reading on time.   1 2 3 4

48. If a book is interesting, I don't care how hard it is to read.   1 2 3 4

49. I like to finish my reading before other students.   1 2 3 4

50. In comparison to my other school subjects, I am best at reading.   1 2 3 4

51. I am willing to work hard to read better than my friends.   1 2 3 4

52. I don't like it when there are too many people in the story.   1 2 3 4

53. It is very important to me to be a good reader.   1 2 3 4

54. In comparison to other activities I do, it is very important to me to be a good reader.   1 2 3 4

Appendix C

*Name*_____

ATTITUDES TOWARD READING INVENTORY

Directions: This questionnaire has sentences about your attitude toward reading. There are no right or wrong answers. Read each carefully. Circle the answer that matches how you feel.

1. Reading is a very worthwhile and necessary subject.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

2. I want to improve my reading skills.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

3. I get a lot of satisfaction out of reading.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

4. Reading teaches you to think.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

5. Reading is important in everyday life.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

6. Reading is one of the most important subjects for people to study.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

7. Reading classes will helpful no matter what I want to do when I am older.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

8. I can think of ways to use reading outside of school.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

9. Reading is one of my most dreaded subjects.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

10. My mind goes blank and I am unable to think clearly when reading.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

11.   Practicing reading makes me nervous.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

12. Reading makes me feel uncomfortable.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

13. I am always under terrible stress in a reading class.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

14. When I hear the word reading, I have a feeling of dislike..

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

15. It makes me nervous to even think about reading.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

16. Reading does not scare me at all.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

17. I have a lot of self-confidence when it comes to reading

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   .E. Strongly Agree

18. I am able to read without too much difficulty.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

19. I expect to do fairly well in any reading class I take.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

20. I am always confused in reading class.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

21. I feel nervous when trying to read.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

22. I learn reading skills easily.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

23. I am confident that I can become a better reader.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

24. I usually enjoy reading in school.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

25. Reading is boring

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

26. I like to challenge myself when reading.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

27. I would prefer to read than to write an essay.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

28. I would like to avoid using reading in school.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

29. I really like reading.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

30. I am happier in a reading class than in any other class.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

31. Reading is a very interesting subject.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

32. I think reading higher level texts is useful.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

33. I believe reading helps me in other areas.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

34. I am comfortable answering questions in reading class.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

35. Being a good reader will help me when I grow up and get a job.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

36. I believe I am good at reading.

    A. Strongly Disagree   B. Disagree   C. Neutral   D. Agree   E. Strongly Agree

Appendix D

Name _____

Number_____

Giraffes Test

1. In order to pump blood to its head, a giraffe must have a very strong:

    a. head

    b. heart

    c. tail

    d. blood

2. Giraffes travel in groups called

    a. herds

    b. tribes

    c. packs

    d. flocks

3. Which of the following describes a giraffe's tongue?

    a. long and pink

    b. short and pink

    c. long and black

    d. short and black

4. Baby giraffes are called:

    a. joeys

    b. ponies

    c. bulls

    d. calves

5. Write 1-2 full sentences describing where giraffes live on the lines below

    _____

    _____

    _____

6. Which of the following is related to the giraffe?

    a. Okapi

    b. Camel

    c. Leopard

    d. Elephant

7. Giraffes do NOT eat:

    a. Flowers

    b. Vines

    c. Meat

    d. Leaves

8. In the passage titled "Great Giraffes" by Linda Ruggieri, why does she describe giraffes as great?

    a. Because giraffes are the best animal

    b. Because giraffes are the tallest animal in the world

    c. Because giraffes are very old

    d. Because the passage is very long

9. How do giraffes *usually* sleep?

    a. Standing up

    b. Laying stretched out

    c. Hanging their necks in a tree

    d. Sitting down

10. Write 1-2 full sentences describing at least 3 attributes of giraffes.

_____

_____

Appendix E

Name _____

Number_____

Rosa Parks Test

1. What state was Rosa Parks from?

    a. Georgia

    b. Alabama

    c. Tennessee

    d. Mississippi

2. What organization was Rosa Parks the secretary of?

    a. The NAACP

    b. The Montgomery bus drivers organization

    c. NASA

    d. The Supreme Court

3. Which of the following most accurately describes Rosa Parks' character based on what you read?

    a. lonely

    b. friendly

    c. brave

    d. melancholy

4. What happened that on December 1, 1955 when Rosa Parks rode a bus?

    a. Rosa was standing refused to sit down

    b. Rosa was sitting and refused to give her seat to a white man

    c. Rosa was sitting and refused to give her seat to an older black woman

    d. Rosa walked to the front of the bus and demanded that a white man give her the seat he was in.

5. Write 1-2 full sentences describing an aspect of Rosa Parks' childhood.

    _____

    _____

6. After the NAACP got Rosa out of jail, what did they plan for every African American in Montgomery to do?

   a. Throw tea into the Boston Harbor

   b. Destroy all of the busses

   c. Make riding buses illegal for everyone

   d. Boycott Busses

7. What was Rosa Parks' husband's name?

   a. Raymond

   b. Richard

   c. Ronald

   d. Reggie

8. What does the word **discrimination** mean?

   a. It is when people refuse to buy or use something

   b. it is when people treat other differently for unfair reasons

   c. it is when people are separated

   d. it means something is against the law

9. What was a result of the bus boycott?

   a. Black people were no longer allowed to ride buses at all

   b. The Supreme Court made segregation on Montgomery buses illegal

   c. Most of the citizens bought cars instead

   d. The Supreme Court ruled that white people would have to give up their seats when an African American wanted to sit

10. Write 1-2 full sentences describing how Rosa Parks' actions affected the lives of other black people in the United States.

   _____

   _____

Appendix F

Name _____
Number_____

Deserts Test

1. Which of the following would you be unlikely to find in a desert habitat?

    a. A kangaroo rat

    b. A tarantula

    c. A spider monkey

    d. A camel

2. Which of the following sentences is true about all deserts?

    a. All deserts are rocky

    b. All deserts are dry

    c. All deserts are in Africa

    d. All deserts are sandy

3. What type of plant would be least likely to survive in the desert?

    a. A plant that can store a lot of water

    b. A plant that has long roots going deep into the ground

    c. A plant that needs very little water to survive

    d. A plant that needs rain on a weekly basis to survive

4. Where is the Sahara desert located?

    a. Africa

    b. Europe

    c. Asia

    d. North America

5. Write 1-2 full sentences describing a desert climate.

   _____

   _____

6. Which of the following is true about rain in deserts?

    a. It only rains in cold deserts

    b. On average, deserts get less than 10 inches of rain every year

    c. It only rains in hot deserts

    d. On average, deserts get more than 10 feet of rain every year

7. The Gobi desert and Antarctica are examples of what kind of desert?

    a. Sandy deserts

    b. African deserts

    c. Hot deserts

    d. Cold deserts

8. How do the spines on a cactus help it adapt to the desert?

    a. The spines protect the cactus from predators

    b. The spines help the cactus soak up rain

    c. The spines keep the cactus standing upright

    d. The spines store half of the cactus' water

9. Which landform would most likely be found in a desert?

    a. A forest

    b. A river

    c. An oasis

    d. A peninsula

10. Write 1-2 full sentences describing animals that could be found in a desert.

_____

_____

Appendix G

Name _____

Number_____

Recycling Test

1. Where does most trash go?

    a. Into the ocean

    b. Into the air

    c. Into sanitary landfills

    d. Into recycling centers

2. What does the word "recycling" mean?

    a. A process of reusing materials instead of throwing them away.

    b. To separate your garbage into bins

    c. To burn things instead of throwing them away

    d. To rotate trash through a cycle of steps before it goes to the landfill

3. Which of the following is NOT a part of recycling?

    a. Throwing a candy wrapper in the garbage

    b. Reusing a can as a pencil holder

    c. Putting a glass bottle into a recycling bin

    d. Taking recycling bins to a recycling center

4. What can recycled paper be made into?

    a. Glass containers and windows

    b. Cardboard or insulation

    c. Aluminum foil and tin cans

    d. Steel playground equipment

5. Write 1-2 full sentences describing what happens to trash that isn't recycled.

    _____

    _____

6. Making a soda can from scratch uses _____ power than recycling cans.

   a. More

   b. Less

   c. The same

   d. Neither process uses power

7. Which is not a step in recycling plastic?

   a. People put plastic into recycling bins

   b. Plastic is washed, chopped, and dried

   c. Plastic pieces are heated until they melt

   d. Plastic is cooled by freezing it in a block of ice

8. What is the gradual rise of the Earth's average temperature called?

   a. Heat Wave

   b. Heated Warming

   c. Global Warming

   d. Global Waves

9. Which is an example of reducing waste? (Think of the phrase "reduce, reuse, recycle")

   a. To take trash that could be thrown away and use it for another purpose

   b. Old paper being turned to pulp and then used to create new paper

   c. Buying a recycling bin to keep at home

   d. Buying items in bulk that use less packaging as well as reusable items

10. Write 1-2 full sentences describing how an item might be recycled.

   _____

   _____