Barclay College

Acquiring Spanish through the Methods of SUN and TPR:

Discovering How SUN Enhances Comprehension and Retention Through Vocabulary

A Capstone Research Paper

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Abstract

Language acquisition as an adult can be an arduous journey including understanding where to begin. Explicit vocabulary instruction is a method that researchers find unfavorable as well as mundane in this process. Yet, pairing explicit vocabulary instruction with a methodology that plays a role in how brain memory functions could potentially lead to some impactful outcomes. This study was conducted to gain an understanding of which methodology, Symbolic Universal Notation (SUN) or Total Physical Response (TPR), would improve comprehension and retention while being taught vocabulary of another language, Spanish. In this quasi-experimental study, a total of twenty-four individuals were included, with fourteen participating in each of the methodologies. After directly teaching vocabulary and performing various assessments, it was concluded that the results supported SUN as the methodology that better enhanced comprehension and retention over short and extended periods of time. These results add more literature to the topic of teaching vocabulary explicitly while also supporting a lack of literature surrounding the new methodology SUN.

The Commencement of This Study

As a young child, knowing a second language had been engrained into me as something that is valuable and necessary to communicate with those that are near and dear to my heart. What I was not aware of as a child was the struggle of learning languages. It was not until high school, when I began to learn French, that I realized there was so much involved in this process. From grammatical structure to the conjugation of words to choosing the correct tense while also learning how to read, write, and speak can all be overwhelming. While I was fortunate enough to have a desire to learn and stick with it, it was also my instructor's willingness to exude an excitement of the language that led me to continue to pursue it.

In time, what I had come to see many years later, would leave an unforgettable impression. This moment in time was my interaction with a language called Symbolic Universal Notation or SUN. It was created for people who are Deaf and Deaf-Blind. Never had I seen a language process picked up so quickly. Never had I understood the possibility, but there it was before me. I saw the comprehension of the symbols, their meaning, and even their retention of it throughout the course of a week. Not only were they able to recite the words, but they were able to create sentences and read others' too. It was an unforgettable moment.

From Exploration to Experimentation

If we fast-forward, not too long ago, my boss approached me and described the possibility of using SUN to teach other languages. In a sense, he described using it as a two-tiered literacy system that would potentially be used to teach a new language not only quickly, but effectively. Of course, it sparked my curiosity. It led me to reflect upon the grander picture of the components necessary to effectively teach, comprehend, and retain language. This also guided me to think about whether symbols could compare to actions when learning language.

Understanding these factors, initiated the pursuit to see what research was available regarding SUN and movement. While exploring, I would end up discovering Total Physical Response or TPR. It's effectiveness in using movement to teach language acquisition specifically through vocabulary enticed me to continue to engage in this topic (Castro 2010). These explorations led me to conduct a study not only involving SUN, but also TPR's direct impact in teaching vocabulary. It would also focus on the impact it would have on comprehension over a short and extended period of time.

Researching Fluency and Retention in the Process of Language Acquisition

Language acquisition is a fascinating process, especially as an adult. It is said often that it is significantly more difficult to learn a second language once an individual has become an adult (Wang 2015). Even so, there isn't a ton of literature to delve into when it comes to understanding the effects on why or how to improve retention and fluency to succeed in second language courses for adults. I searched across nine EBSCOhost databases as well as JSTOR to try and find research, but my search only landed five studies. Rachael Hulme (2018), Erin Isbilen (2018), Karla McGregor (2014), and Diana Pili-Moss (2019) are four authors who have researched the topic of retention in relation to second language acquisition and vocabulary. Of the five studies, only one journal was related to discussing fluency in relation to second language success. As a result, it can be noted in my quest for literature in this field there seemed to be limited findings. Perhaps uncovering a need to research these areas for ways to enhance both fluency and retention. Throughout this research process, retention will demonstrate the amount of language remembered over time, specifically, over the course of twenty-four hours and several weeks.

Instructor vs. Learner Perspectives

While there are varying aspects to success and failure in acquiring a new language, there are some aspects that come from the learner perspective and some that arise from the teacher perspective. For learners, some instances that can lead to success or failure depending on how they are managed are motivation, dedication/commitment, attendance, methodology in the classroom used to teach, other responsibilities outside of the classroom, and use of language outside the course itself (Rojas-Barreto & Artunduaga-Cuellar 2018; Blackmer 2016). Therefore, managing each of those in a way that is conducive of successful learning would be key to working through the course to acquire the language. While it seems as though there are many student dependent goals, it is highly important that the student fully desire to want to learn the language. Without the desire, motivation, or perseverance, the teacher is left with little that they are able to do, because there is also responsibility placed on the learner (Soare 2020).

With that being said, the teacher does have responsibilities to the students in their classroom. First and foremost, it is important that they are qualified to teach the course, yet qualifications on paper isn't always everything. While it is important that professors do have their credentials they should also be able to engage the students, as Stansfield and Hornor describe their opinion that professors need , "...vitality and enthusiasm…for effective teaching" (1980). While this is not always the case, it is a reminder that there is more to engaging students than what a professor knows, but the way they depict their knowledge can lead to further engagement and understanding of the content. With that crucial piece mentioned, here are a few more aspects that are also impactful: engaging the room, sharing the expectations, hearing students' expectations, focus on explicit vocabulary instruction, interaction with course content that leads to higher-level thinking, and teaching methodology (Larrotta 2011). Each component

builds upon itself to create a classroom atmosphere that will enhance learning and improve the skills of the learner as well (Słowik-Krogulec 2019).

<div align="center">Direct Vocabulary Instruction and Method of Instruction</div>

While both professors and students have responsibilities to be successful, there are two that will be focused on for the purposes of researching this topic in more depth. These two components are mainly focused on professor responsibilities, but it is also important for the student to be active in participating throughout the course as well. The aspects chosen are direct vocabulary instruction and the teacher method of instruction (Cormier 1988; Larrotta 2011). Each of these aspects were selected for this present study because they have shown significant impact separately but combining the two creates intrigue. The purpose of combining the two would be to analyze the impact vocabulary and the method of teacher instruction effects the learner.

First, in the past, vocabulary was seen as unimportant when learning a language because instructors stated that the focus should not be taken away from grammar and sentence structure (Amiryousefi 2010). This even led to the idea that it couldn't be taught because vocabulary needed to be experienced. Perhaps, this is why vocabulary is often seen as something that can become mundane or could also become offensive or irrelevant. This then causes learners to drift from that desire of wanting to learn (Madrigal-Hopes 2014). Therefore, this becomes a critical point for a professor or teacher to dig into the interests of students to make the learning most impactful.

Second, the teacher method of instruction in foreign language courses tends to be teacher-centered in a way that does not engage students to truly interact with content in a meaningful way (Samifanni 2020). Therefore, a teacher with enthusiasm can make all the difference

(Cormier 1988). Cormier, actually uses a method created in the 1960s called the Dartmouth method (Stansfield and Hornor 1980). He used this method in a language and culture immersion workshop that showcased the way the instructor presented themself is a factor that was impactful for students during the workshop. It is this method that led to the combination of seeking to understand the potential benefits of both vocabulary and teacher methodology. The Dartmouth method is helpful, but another area to investigate is creating an environment of trust that builds relationships between the student and instructor (Samifanni 2020). This brings a level of confidence that can encourage and allow students to be comfortable in making mistakes and trusting teacher direction and decisions as well. Therefore, combining the aspects of an instructor teaching larger than life as well as making those bonds with their students could potentially show results that encourage these ideas.

Language Acquisition Methods

As described previously, the teacher that instructs the course plays a significant role in learning a new language, but the methods used have an equally significant role. The language acquisition methods being used to teach vocabulary in this study are TPR and SUN. Both methodologies vary significantly from each other. Therefore, in the following section, both will be defined as to how they will be used in this study.

Defining Total Physical Response

Diving into the research behind the Dartmouth method was fascinating. Understanding the way the teacher was fully immersing themselves and their students into language led me to wonder if there were other methodologies that were just as immersive. This wondering led me to find Total Physical Response.

TPR was crafted by a man named James J. Asher. This method was discovered when experimenting with language acquisition while observing a student internalizing the Japanese language when performing the commands. He watched and noticed that he was using movement along with the words to make the connection behind their meaning (Asher 1966). In this study, TPR was defined as a method of teaching language or vocabulary concepts by using physical movement to react to verbal or written input. Specific movements for each of the vocabulary words were provided to help make connections with the definitions.

TPR Teaching Vocabulary Through Stories

Knowing how TPR uses motions to make connections with language comprehension and retention, it isn't surprising that creating stories or learning through them would come naturally. In the study, *Incidental Learning and Long-Term Retention of New Word Meanings from Stories: The Effect of Number of Exposures*, Hulme (2018) shares how her finding demonstrated that long term retention was not affected significantly. Participants were able to recall incidental vocabulary learned a week prior through a story shared one time. In another study, Castro, shares his experience of using stories to teach language acquisition through the use of vocabulary. The impact made through TPR storytelling was significant and there was empirical evidence to demonstrate this. The average of incorrect responses during the pretest was an average of thirteen percent while the posttest scored an average of sixty-three percent (Castro 2010). Even in another study done with seventh grade students, Khakim (2019) does research with explicit vocabulary teaching using TPR and his results were as follows, "The result in the mean score of pre-test in experimental group and control group were 51.54 and 50.46 and the mean score of post-test in experimental group and control group were 76.31 and 63.85." A clear distinction is found between the gain scores showing that TPR helps benefit the direct instruction even more.

Therefore, if stories are being used to teach vocabulary incidentally, then when looking at others' findings how much valuable would direct instruction be?

Defining Symbolic Universal Notation

SUN "is a symbolic representation of all the words in Scripture. It consists of a small group of universally recognized characters that are then combined or altered to make additional symbols which are called extensions. Between the characters and extensions, all of Scripture can be represented" (Bible in Every Language). In this study, the symbols will be used to directly teach vocabulary to participants.

Defining Comprehension

For the purposes of this study, comprehension will be defined as understanding how to read a text in the language given and being able to respond to questions in the form of written response. It can also be elicited through the creation of a play, presentation of interest, or even a game.

Making an Impact on Memory

Both SUN and TPR are taught with enthusiasm which lead to connections and engagement with the content (Castro 2010). When applying the enthusiasm and the unique characteristics of each methodology, it leads to intrigue on whether that increases retention within a short and long term period of time. Since SUN is such a new methodology, there is no research that has been completed to support whether SUN helps learners retain information over the short and long term. On the other hand, TPR has been around for much more time. Yet regardless of how long each of the methodologies have been around, our cognitive abilities must be addressed in order to understand the effect that they are making.

To begin with, there is a process known as lateralization in the brain where information will cross from the left to the right to process in varying ways. This allows for the brain to not only comprehend information but retain it as well (Price 2020). This switch of interaction between both sides of the brain plays an impact on memory because it is causing the whole brain to work allowing all of the information to process together (Goldie 2015). When discussing both SUN and TPR, each of them start with right brain tasks such as intuitive thought, non-verbal action, and even imagination. After their initial encounter with the methodologies, the thinking switches to the left side rather quickly completing tasks where they are required to use analytical thought to discover the meaning of a story and plan their own which again cases the thinking to switch to left side. This time using creativity through writing and art while using their imagination. This process continues throughout the entirety of the study. This is a critical aspect because of the role it plays within the brain and how it will retain information.

Another window of opportunity for TPR and SUN to make an impact on memory as well as comprehension is by incorporating Bloom's Taxonomy of higher-level thinking. This engages the participants in their short and long term memory. As one trails up the levels of taxonomy, the deeper the learner will interact with the content presented to them. The more that participants interact the more the learner will remember the language and be able to engage with the language that is being learned. This is especially true as the language being taught is chunked for the purpose of retention and comprehension. Isbilen (2018) states her findings as "the incoming sensory signal must be processed and encoded as soon as it is encountered, before it is lost or overwritten by new incoming material." The methods that have been created for this study allow time to process before moving on to new information. It even allows time to create and apply their learning for the day. Again, this reinforces the thinking of the content at various levels by

using small chunks of language to achieve both comprehension and retention in the short and long term.

Purpose of the Study

Understanding how each of the methodologies can be applied to language acquisition to enhance memory and comprehension were the critical pieces in knowing the direction to take for this study. This understanding led me to specifically question how vocabulary would impact both comprehension and retention as expressed in my question for this study: when teaching adult learners another language, which method, Toral Physical Response (TPR) or Symbolic Universal Notation (SUN), will show itself to enhance comprehension and retention when they are used to teach vocabulary?

Hypothesis

Based on previous experiences with SUN, I believe that it will not only build vocabulary depth but provide a conceptual understanding of how language flows. Due to the lack of research for the new methodology of SUN, studies that can be used to support this idea are limited. Even so, SUN is designed and taught in way that does tap in to how the brain functions. It works through the process of brain lateralization. This naturally occurs when teaching SUN because it moves quickly from task to task to support memory through application by incorporating simple to complex tasks that shifts thinking from the brain from left to right. Hence, through each of these aspects and its visual connections, I think it will allow adult learners to retain and comprehend more of the Spanish language. While TPR will also make connections, I do not think that it will be as successful in the comprehension aspect. With that being said, the results will only account for ten hours' worth of Spanish taught throughout each week.

Methods

Now having insight into where this study commenced, the purpose of it, and the definition behind TPR and SUN next is grasping how the research question was carried out. This aspect is a critical piece in yielding results that can be utilized and added to the literature.

Research Design

The quantitative research design chosen for this study was the quasi-experimental. The reason was because there was potential for there not to be randomness in groupings to occur. It was truly dependent on the number of the participants available as well as their background knowledge of the Spanish language. These participants were broken up within two categories: limited exposure to language and minimal exposure to language. Limited exposure referred to participants who knew less than seventy-five words, could not form complete sentences, and could not read a text and comprehend it. Minimal exposure referred to the participant either knowing nothing about the language or a handful of words.

Separating participants based on their level allowed randomness to occur within the groups but did not allow randomness to occur entirely due to specific placement of certain individuals in order to be able to address the treatment of the participants properly. The quasi-experimental design chosen also incorporated a pretest and posttest which was most beneficial in answering the research question for this study. This allowed for me to see what participants already knew, then allowed me to proceed sorting the groups, as well as learn how much was learned based on the method taught.

Participants

A total of twenty-eight participants were used who had either no experience with the Spanish language or very limited exposure to the language. Participants were ages fourteen and

older. Each of the participants were gathered through churches or seminaries in the United States, Nigeria, and Ethiopia.

A teacher was chosen for this study. The same person was used throughout each setting so that there would be no interference between weeks with things such as personality and consistency. The instructor chosen already knew SUN and TPR so there was no need to reteach the methods. This person was given time to go over the procedures, ask questions, and met with me in order to best carryout the plan. This person also had a background in teaching.

Ethical Considerations

The instructor and participants were asked to sign a consent to show that they were willing to participate knowing that the methods would differ and that they would not be able to choose the method they participated in. They were also informed that no harm would come from participating in the study and that the results found were confidential. This was included in the survey (see appendix A).

The instructor chosen signed that he would not favor one method over the other and that the treatment of them would be equal. In order to minimize bias, so that it would not lead to a confounding variable, the instructor was observed by me. I wrote my findings in a journal. These findings included the categories of enthusiasm, energy level, confidence, and other. Other was used to take note of any comments or actions that denoted favoritism or bias towards a method. It is important to mention that the acceptance or rejection of the hypothesis by the instructor did not affect the procedural outcome. The procedures were a container to be followed and I was able to confirm that each step was being followed as expected. Even so, as the researcher, I observed the instructor to make sure that there were no behaviors that impeded upon the results of this study.

Setting

The setting took place in either classroom-like rooms or in a home. Each method conducted had an equal number of trials that took place at each of the locations. The atmosphere provided an environment that was conducive to learning. All sessions took place in the evening.

Variables

The independent variables are the methodologies (SUN and TPR) used because they will impact the results. Each will have an effect on the dependent variables. The dependent variables are comprehension and retention. Based on the methodologies taught, the dependent variables will be affected and evidenced through the use of activities, observations, and assessments. The teaching methods of SUN and TPR will not be mixed. Neither methodology will be reflected in combination. Each method will be placed in a container of its own so that both can be tested for their own effectiveness and in comparison to each other.

Materials

- Survey (Using Microsoft Forms, see appendix A)
- Pre-Test /Post-Test (Same test, see appendix B)
- SUN cards (see appendix C)
- Notebook
- Writing Utensils (specifically black and red pen)
- Camera
- Dry-Erase Board
- Dry-Erase markers
- Projector
- Laptop
- Observation Sheet (see appendix D)
- Biblical Passage in Spanish (2 Peter 1, version Biblia Reina Valera, see appendix E)
- Short Spanish Stories (see appendix F)
- Group Story Meanings Sheet (see appendix G)
- Daily Retention Quizzes (see appendix H)
- TPR Vocabulary Cards for Movement (see appendix I)
- Data Analyzed (see appendix J)
- Weekly Quizzes conducted after the week of study (see appendix K)
- Journal
- Gift Cards

Procedures

It is important to describe that the structure of each week was very similar. The constants between both weeks included the amount of time spent learning the Spanish language, similar environments, the same instructor, the same assessments, and the same activities (e.g. Spanish stories, creating stories, etc.). The only difference was the methodology taught. The methods used were not intertwined in any way. Each of them were used separately and according to the procedures given below (find detailed procedures in appendix L). The methods taught were tested through the participants ability to retain and comprehend each day as well as after the week had ended.

Selection of Participants

Participants were selected by asking church groups and seminaries if they had attendees that would be interested in learning the Spanish language who had no experience in it or limited exposure. If a person was interested, they filled out a survey (see appendix A). If selected, participants were given key details about meeting dates and times.

Teacher Selection

The selection of the instructor took place by conducting interviews by phone. Notes were taken to decide upon which person would fit best. The person was not required to know both SUN and TPR because each of those could be taught. Regardless, the person selected did already know both methodologies.

Teaching Spanish Through SUN Methodology

During the week of SUN, the first thing that participants were given was the pretest. Immediately following that, participants began the first SUN lesson. All SUN lessons were conducted the same way. Five cards were shared and reviewed before the next five were shared.

This continued until all twenty cards for the day had been shared and reviewed by the participants. After completing the SUN cards, the group was shown a chart that showed examples of words with different conjugations. Immediately after, every person received a short story quiz. Everyone was given time to complete it alone and then they worked together to fill in any blanks. Times where participants worked together were noted with a different color pen. Once this step was complete, participants worked in groups to create their own story. When groups were done, each group shared their story while the groups watching wrote down what they thought it meant. Then, they were able to hear what the story meant in English to see if they understood. Groups would then rotate until all groups took a turn. Once this was completed, the remainder of the time consisted of time for questions.

The remainder of the days were the same as the first. The only differences consisted of there being no pretest being conducted during the last four days, a vocabulary quiz being given at the start of class on days two to five, and a posttest on the final day. Everything else was done in the same order as day one.

Teaching Spanish Through TPR Methodology

During the week of TPR, the first thing that participants were given was the pretest. Immediately following that, participants began the first TPR lesson. All TPR lessons were conducted the same way. Five cards were shared and reviewed before the next five were shared. This continued until all twenty cards for the day had been shared and reviewed by the participants. After completing the TPR cards, the group was shown a chart that showed examples of words with different conjugations. Immediately after, every person received a short story quiz. Everyone was given time to complete it alone and then they worked together to fill in any blanks. Times where participants worked together were noted with a different color pen. Once this step

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was complete, participants worked in groups to create their own story. When groups were done, each group shared their story while the groups watching wrote down what they thought it meant. Then, they were able to hear what the story meant in English to see if they understood. Groups would then rotate until all groups took a turn. Once this was completed, the remainder of the time consisted of time for questions.

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Weeks After Each Study Conducted

Participants received a Short Spanish Story for them to work through each week for four weeks. The participants were told to complete it without help and then they were to send it back when complete. These were completed for both groups to see how much was retained from each method (see appendix K).

Results

In this section, the results will show how the data collected supported the exploration of this study. The goal was to find whether TPR or SUN was able to enhance comprehension and retention when teaching vocabulary. You will find discussion regarding the research question prior to finding the charts demonstrating the mean of each section to clarify any discrepancies that would be unclear in the visuals (to find all data points look at appendix M).

Data Collection Method

To assess whether these methodologies aide in the process of learning another language, two components were monitored. They were the areas of comprehension and retention of language over time. The assessments used included a pretest, posttest, daily quizzes, a short story quiz, and a Forms Microsoft Quiz. All assessment tools were collected from participants and then graded by me. Grading occurred by checking the accuracy of the words translated from English to Spanish and at times from Spanish to English. Following this, all data were inputted into tables for a clear depiction of what was completed by each participant daily and weekly.

The mean will be expressed throughout each assessment to show the averages of participants and to help balance any irregularities that may be found in either group. This will also help identify the amount of growth and retention found with each participant. Overall, it will be noted how SUN enhanced comprehension and retention more than TPR throughout each of the sections.

Comprehension (Daily)

This section will present the data collected on short story daily quizzes. These quizzes were given the same day the vocabulary was taught. Therefore, this portion of the data only tested comprehension of the vocabulary that had been learned by the participant in less than twenty-four hours.

When looking at the results, it can be quickly identified that day five showed the highest success rates while day four showed the least amount of comprehension (see appendix M). Each piece of evidence for this section shows a clear indication as to which method enhanced comprehension more so than the other. When looking at the mean, the final average shows that

SUN performed better than TPR. This demonstrated that SUN was the method that better

enhanced comprehension for this section.

Short Story Quizzes Chart

Short Story Quizzes	SUN Daily Mean	TPR Daily Mean
Short Story Quiz 1	$\dfrac{21}{39}$	$\dfrac{20}{39}$
Short Story Quiz 2	$\dfrac{21}{30}$	$\dfrac{21}{30}$
Short Story Quiz 3	$\dfrac{21}{37}$	$\dfrac{20}{37}$
Short Story Quiz 4	$\dfrac{20}{35}$	$\dfrac{19}{35}$
Short Story Quiz 5	$\dfrac{28}{52}$	$\dfrac{28}{52}$
Weekly Mean	$\dfrac{111}{193} = 58\%$	$\dfrac{108}{193} = 56\%$

Comprehension and Retention (Short-Term)

Throughout this component, the goal is to showcase what was remembered and

understood within a twenty-four hour period. This data will be used to compare the results with

the long-term data to see if there are any similarities or differences between the short and long-

term.

When looking at the raw data, it may appear difficult to grasp which group performed

better than the other each day as well as collectively. First, it can be clearly seen that the daily

quiz 4 had the lowest results for the entire week whether it was SUN or TPR. Also, when

looking at the lines in the graph (see appendix M), it can be seen how the daily quiz one and two,

were where participants scored higher. Towards the end of the week both daily quiz three and

four are significantly below its counterparts. To verify these points, the mean was taken for each of the days and then for the week as well. The means are represented in the chart below. Based on the data, one can conclude that SUN performed better with daily retention and comprehension.

SUN and TPR Daily Quizzes Chart

Daily Quizzes	SUN Daily Mean	TPR Daily Mean
Daily Quiz 1	$\frac{16}{20}$	$\frac{16}{20}$
Daily Quiz 2	$\frac{17}{20}$	$\frac{16}{20}$
Daily Quiz 3	$\frac{16}{20}$	$\frac{14}{20}$
Daily Quiz 4	$\frac{14}{20}$	$\frac{12}{20}$
Weekly Mean	$\frac{16}{20} = 80\%$	$\frac{15}{20} = 75\%$

Pretest and Posttest

When looking at the raw data of the pretest and posttest, it can be clearly and quickly seen that everyone in the group knew less than a third of what would be learned throughout the week. Both groups had very similar pretest scores. Both groups had participants who scored a single digit, nine participants who scored between the ten to twenty-nine range, and then four participants who scored higher than that range. Both of the highest scores were in the seventies and one was located in each group. This indicates how the playing field was leveled when comparing results between the groups.

The mean was taken to show growth between the pretest and posttest. It can be seen in the chart below, SUN, began with nine percent and TPR with a ten percent understanding of the passage. Both methodologies again, performed similarly, but this time it can be concluded that TPR had the higher scores overall with five percent more growth shown by the end of the week. SUN and TPR Chart of Gain Scores

Assessment	SUN Mean	TPR Mean
Pretest	$\frac{27}{295} = 9\%$	$\frac{29}{295} = 10\%$
Posttest	$\frac{127}{295} = 43\%$	$\frac{144}{295} = 49\%$
Growth Shown	$\frac{100}{295} = 34\%$	$\frac{115}{295} = 39\%$

Comprehension and Retention (Extended Period of Time)

In this section, the goal of the data is to represent which methodology performed best in comprehension and retention over a four-week period of time. This section achieves that by having sent out weekly quizzes to participants related to the specific vocabulary learned. When completed, the scores were inputted into the tables (see appendix M).

Immediately when looking at the charts, it can be clearly seen that not all participants contributed to the results of this section (see appendix M). There were about five participants within each group that did not complete most or any of the quizzes sent out weekly. Even so, the remaining of the participants' data were analyzed.

When looking at the amount of language retained and understood, it can be stated that it was relatively consistent between both groups. To verify this, the table below shows the mean over the course of each week and the entirety of the four weeks. Overall, the data shows a steady diminishing of language retention over the course of each week with the exception of week two.

Week two was the highest scoring section for both groups. Through the means presented in this chart, it is clear that SUN showed a higher comprehension and retention rate over an extended period of time.

Weekly Quizzes Chart

Weekly Quizzes	SUN Mean	TPR Mean
Week 1	$\frac{25}{39} = 65\ \%$	$\frac{22}{39} = 56\%$
Week 2	$\frac{22}{30} = 73\ \%$	$\frac{20}{30} = 66\ \%$
Week 3	$\frac{24}{36} = 66\ \%$	$\frac{23}{36} = 64\ \%$
Week 4	$\frac{21}{33} = 64\ \%$	$\frac{18}{33} = 56\ \%$
Mean of all 4 weeks	$\frac{92}{138} = 67\ \%$	$\frac{83}{138} = 60\ \%$

t-Test Analysis

In order to understand if the methodology the group participated in had an effect on the individuals, it was necessary to conduct a t-test. The specific test used for this analysis was the t-test: paired two sample for means. It was chosen because the study aimed to compare two separate treatments and identify if there was a difference based on the results. The importance of running the t-test was to show that there was a significance in the difference between the methodologies used to teach vocabulary during the language acquisition process.

These statistical tests were conducted by utilizing the results from each of the assessments given throughout the study (see appendix O). Two of the four times the t-test was

conducted the t-scores were significantly above the critical t-score. Therefore, the two

assessments: Daily Quizzes and Weekly Quizzes were above the critical score. This signaled that

there was a substantial difference between the groups.

The method that represented the considerable difference was SUN. This signifies how

SUN's impact on the participants in relation to comprehension and retention benefitted the group

in a sizable and recognizable way compared to the TPR group. It can be captured as follows: the

fourteen participants who received the SUN intervention (M = 15.4, SD = 1.68) compared to the

fourteen participants who received the TPR intervention (M = 13.7, SD = 2.04) demonstrated

significantly better peak flow scores when comparing daily quiz results, t(2) = 7.4, p = .01. This

was again true when comparing the weekly quizzes conducted after the study. The participants

who received the SUN intervention (M = 22.2, SD = 1.32) compared to the participants who

received the TPR intervention (M = 20.3, SD = 2.17) demonstrated significantly better peak flow

scores, t(2) = 7.4, p = .06. Meanwhile, in the assessments of short story quizzes and pretest and

posttest there was no sizable effect on the participants. Identifying that both methods had similar

effects on their individuals.

Overall Conclusion of Results

SUN performed better than TPR in three of the four areas: the short story quizzes, daily

quizzes, and the weekly quizzes conducted after the study (see figure 1). This testifies to how

SUN better enhanced the comprehension and retention of a learner acquiring Spanish as a second

language. The evidence demonstrates how SUN not only benefited learners in the short-term, but

in the long-term as well. TPR was a close competitor. Its results did show that it enhanced the

participants comprehension and retention, but not as well as SUN. The results were supported

through the findings of t-scores sharing the impact that the SUN methodology had in seventy-five percent of the assessments given.

Figure 1
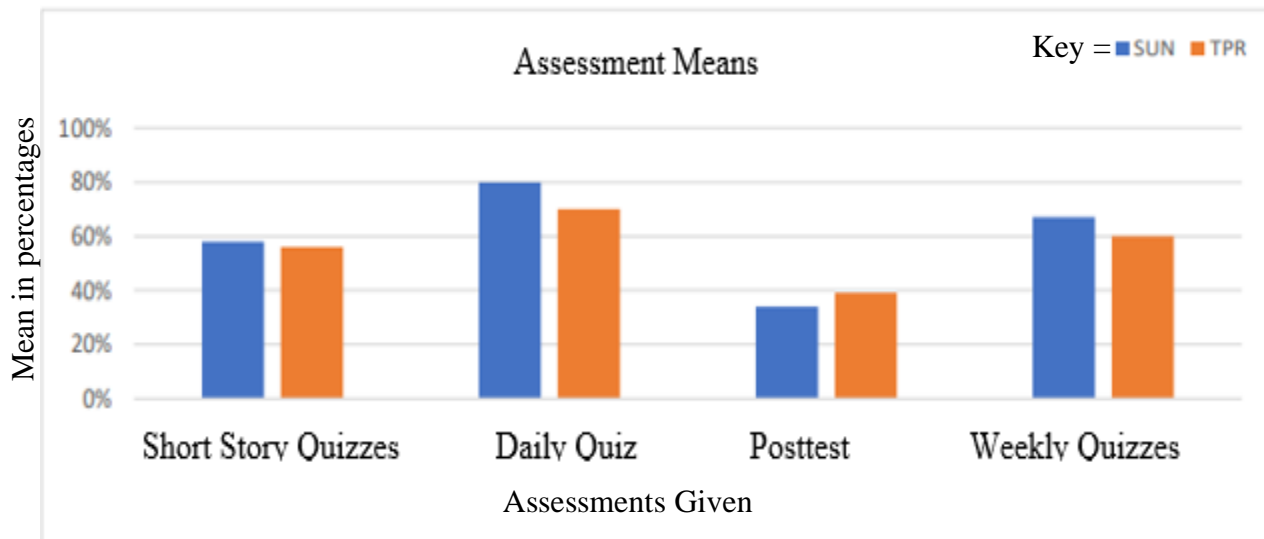
Discussion

Several outcomes were made evident as it relates to teaching vocabulary to enhance comprehension and retention using the methodologies SUN and TPR. SUN was identified as being more effective than TPR in both comprehension and retention over short and extended periods of time. Specifically, regarding this information, there were four major findings regarding comprehension and retention as it relates to the methodologies used while teaching vocabulary. The second, third, and fourth results are all connected to the comprehension and retention of vocabulary over varying periods of time.

Major Findings

Initial Comprehension of the Vocabulary

Immediate comprehension of the vocabulary taught by both methodologies was over fifty percent a hundred percent of the time. Immediate comprehension referred to the short stories that would follow the SUN or TPR lesson and practice. This section provided information regarding how the method was able to be captured by learners in that present moment. While these were some of the highest percentages, the method that had a better performance was SUN. It performed better by two percent. While it is not much, when learning language over the course of time that two percent can become much more.

Comprehension and Retention (Short-Term)

Comprehension and retention over a twenty-four hour period was over seventy percent about eighty-eight percent of the time. This component from the data revolved around the daily quizzes. These were given exactly twenty-four hours after learning the vocabulary and interacting with them the previous day. Therefore, there were only four daily quizzers because twenty-fours would have needed to pass prior to having been given this assessment. This was another area where the participants performed well a majority of the time. Yet, SUN outperformed TPR again by five percent.

Comprehension and Retention (Long-Term)

After a five-day period, comprehension and retention through a pretest/posttest assessment was over thirty percent. This meant that at least one hundred words were gained and retained after five days. Again, the pretest and posttest were identical, and the words used within the assessment were words that were studied throughout the week. It was here where TPR surpassed SUN's percentages by five percent. This demonstrated how TPR supported its learners

over the long term. This section was one where the average of the scores were lowest. This assessment is also the longest. It contains the most words as well as conjugations which requires extra focus to accurately account for what the text is attempting to say.

Comprehension and Retention After the Study (Long Term)

The last major finding was how after the study comprehension and retention results were almost always greater than sixty percent. These after the study assessments were short stories, between three to four sentences, that participants were required to translate without aide or practice after the conclusion of the study. This section was where not all participants contributed. There were an equal amount of people who did not take part from each method. The number of people who did not respond back were four, two from SUN and two from TPR. The number on nonparticipants was not significant and also balanced therefore not completely invalidating the data presented as a majority from both methods contributed. In this section, SUN also performed better than TPR by seven percent. This showed how over the course of a total of four weeks, SUN aided its participants memory in the long term.

Based on these conclusions, it can be stated that overall, SUN benefitted the participants in both the short term and long term while TPR benefitted its participants only in the long term. Even then, TPR's long term was reflective of a week long assessment while SUN's long term reflected weekly assessments after the completion of the study. All in all, SUN enhanced comprehension and retention of language acquisition through vocabulary better than TPR.

Meeting Needs within the Field of Language Acquisition

Each of these outcomes met a need that can be useful to the field of language acquisition. One of those needs involved the debate on whether or not to explicitly teach vocabulary. It was stated that teaching vocabulary was not beneficial, how grammar and sentence structure were

more important, and that vocabulary was something that should be experienced (Madrigal-Hopes 2014). While I do agree that grammar and sentence structure are important, I do not see it as being more important than the others. They go hand in hand. At the same time, I do agree that experiencing language is critical. Both methodologies allow vocabulary to be experienced. SUN is experienced through visuals and TPR through movement. I do find it necessary that vocabulary is learned in order to effectively interact with the language. It is a part of how the learner is able to continue to interact and engage in the language more naturally. It is through understanding the meaning behind the words that people are able to comprehend conversations or passages as was done in this study. By teaching vocabulary explicitly, it allowed participants to engage in language in a way that didn't feel pressured, allowed them to seek out complete thoughts, and build upon the observations they made. It is through these opportunities that it can be seen from the data how vocabulary allowed for participants to grow over the study. This can specifically be seen through the posttest as was identified in major finding number three.

At the same time, if vocabulary isn't remembered then it isn't effective in communicating or applying the language. Therefore, comprehension and retention of vocabulary was the vital point of observation. That is exactly why each of the assessments were focused in on these components and were where the major findings of this study were acquired. This brings us to another need met that is useful to the field of language acquisition. The need would be to decide which methodology would teach vocabulary most effectively. It was critical to understand which methodology would teach the vocabulary in a way that would impact both comprehension and retention in order to better enhance the process of language acquisition. Through the data provided previously, and the figures shown below, it was demonstrated how each of the methodologies performed well in both areas. Yet only one, SUN, performed better in three of the

four assessments. SUN was able to show higher performance in comprehension and retention consistently over the course of the entire length of time the study was conducted (figure 1). SUN was not only able to cross cultures (figure 2), living environments, and the setting of where the lesson took place, but it even crossed age differences as well (figure 3). This was done through the process of teaching vocabulary only and systematically using each methodology to engage the learners. There was not any emphasis on grammar nor sentence structure, yet participants were still engaged and motivated to continue to learn.
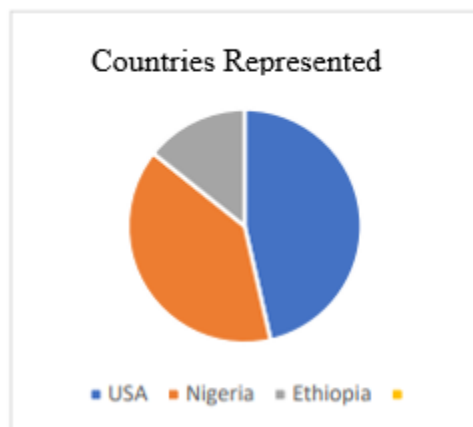
Figure 2

Countries Represented

USA   Nigeria   Ethiopia

Figure 3

Ages Represented

Under 18   18-30   30-40   40-52
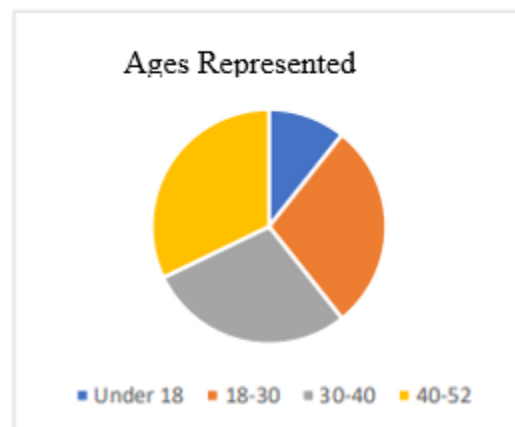
Limitations of the Study

Bias

Having worked with SUN in a variety of ways is a process that has shown me evidence of its strength and impact. Therefore, if not careful, that connection of work done previously with the methodology could impact how the data are interpreted. It is for this reason that the methods for each of these processes were as similar as possible. It is also for this reason that when grading assignments there was not a gray area. All was clear in what was determined as correct.

Conditions

Due to the scheduling, each of these sessions took place in the late afternoon or evening times. As a result, many of the participants were tired from work or other activities that had taken place during the day. This at times led to a lack of motivation from some participants or having students who are sleepy. For example, participant one wrote on the top of his posttest "sleepy." You can also see how the items completed that day were significantly lower than scores on previous days. This has led me to wonder what results could look like if the sessions had taken place in the morning.

Participants were busy and working, as most adults would be, but some were extra distracted taking phone calls or attempting to respond to emails. While these instances were very few, it did make an impact on the individual and led them to not properly obtain the knowledge from the sessions. Also, as a result, two participants did stop joining the sessions and did not complete the study.

Comfortability within the varying locations can also be limiting. Some participants who were in home settings felt more relaxed about the process versus the groups who were in a classroom setting. They felt that they needed to be more focused and intentional about learning the content. This change in environment impacted individuals differently. It is important to note that if participants started in a classroom setting, they stayed in that setting the entire time and vice versa. Also, it is important to recognize that there was an equal number of participants who completed TPR and SUN in each setting.

Responses

For the weekly responses, many participants did not respond the day the email was received. This resulted in later responses meaning that a longer time had passed since their final day of

instruction. This could potentially have meant that they could have forgotten more by the time they did respond to the quiz.

Age

While the ages in figure 2 show a variety of ages spread across various groupings, it does not compare a large enough scope to truly see the effectiveness of SUN and TPR across all age groups. Data for participants younger than 14 or older than 50 was not acquired and therefore there is no data to interpret or connect back to.

Languages Learned

For participants in Nigeria and Ethiopia, this would be their third language being learned. While there were no similarities, these adults have gone through the process of learning another language and understand what is needed to acquire it.

For two participants in the US, both under the ages of eighteen, are in a high school Spanish class. These participants were able to participate because they were still in the beginning stages of the language and did not know a majority of the words that were introduced to them in the study. These participants were separated equally between the methodologies.

Number of Participants

The number of participants used in this study were twenty-eight. Twenty-eight individuals should not account for what could happen across the world if others were to use either of the methodologies. Therefore, the sampling size is a limitation as it is not possible to state that this would be sufficient data.

Summary

The SUN methodology used to teach vocabulary was more effective in enhancing comprehension and retention when acquiring another language than TPR. This finding was determined by analyzing the outcomes of four varying assessments that were conducted from daily periods to weekly periods of time. TPR and SUN's results were consistently very close in averages throughout the entirety of the study. TPR only performed better during the posttest given at the end of the week. Therefore, TPR had a better overall comprehension and retention of the vocabulary words over the course of the week. Meanwhile, SUN had a better overall comprehension and retention of the vocabulary words over immediate, daily, and weekly assessments given.

Impact on the Literature

Ultimately, the results shared demonstrate the benefits of using SUN and TPR to teach vocabulary when teaching a second language. It shows how movement and symbolism help the brain retain information quickly and effectively over the course of several weeks. SUN's performance in this study is beneficial to this methodology because it is new. Thus, providing this methodology with background and with potential of what it can do in the process of language acquisition. Based on the data, there is information supporting retention of language in the short and long term. It also shows how it can be used as a way to comprehend the language being learned. This study also allows for SUN to be directly compared to a methodology that has been around for decades showing that it can be successful as well.

This study will directly impact language instruction because it can lead to efficiency in comprehending and retaining language. Therefore, shortening the amount of time it will take to communicate when acquiring a new language. From personal experience, I have seen SUN do

incredible things and in this study, it was no different. It brings understanding and makes connections by appealing to our sight. In some ways it almost feels game like and it encourages and motivates individuals to attempt to achieve and learn more. The same can be said about TPR. TPR allows people to get up and interact with one another. It can make them uncomfortable initially but when they see the results that's what creates a motivation for people to continue.

<div align="center">Future Research</div>

As a result of these conclusions, new curiosities have arisen, and I hope to conduct further research in the area of language acquisition as it relates to vocabulary, comprehension, and retention. One of these is to dive deeper into the topic of how long it takes a person to acquire a second language in comparison to someone using the methodologies SUN and TPR. It would be interesting to compare the speed and accuracy of the methods over the course of an extended period of time.

Another curiosity regarded including various age groups beyond what was included in this study. It would be helpful to see if each of these methodologies work best with specific age groups or if they were to work with all groups in the same manner. This would also help meet needs within the field of language acquisition as it applies to age.

Lastly, I hope to conduct this research with more participants, from various places, and ages to compare these results. I want to ensure that the conclusions found here were not simply circumstantial but that they are true and that they can benefit and add to what is known in the field of language acquisition.

References

Amiryousefi, Mohammad, and Hossein Vahid Dastjerdi. "Vocabulary: Challenges and Debates." *English Language Teaching* 3, no. 3 (2010).

Asher, James J. "The Learning Strategy of the Total Physical Response: A Review." *The Modern Language Journal* 50, no. 2 (1966): 79.

Blackmer, Rachel, and Rachel Hayes-Harb. "Identifying Effective Methods of Instruction for Adult Emergent Readers through Community-Based Research." *Journal of Research and Practice for Adult Literacy* 5, no. 2 (2016): 35–49.

Castro, Ruben. "A Pilot Study Comparing Total Physical Response Storytelling with the Grammar-Translation Teaching Strategy to Determine Their Effectiveness in Vocabulary Acquisition among English as a Second Language Adult Learners." Graduate Master's Theses, Capstones, and Culminating Projects (May 2010).

Cormier, Raymond. "Language and Culture Immersion: A Winning Enterprise" (1988).

Goldie, John. "The Implications of Brain Lateralization for Modern General Practice." *British Journal of General Practice* 66, no. 642 (2015): 44–45.

Horner, Jeanne, and Charles Stansfield. "The Dartmouth/Rassias Method: An Annotated Bibliography." *The Dartmouth/Rassias Method: An Annotated Bibliograph* (1980).

Hulme, Rachael C., Daria Barsky, and Jennifer M. Rodd. "Incidental Learning and Long-Term Retention of New Word Meanings from Stories: The Effect of Number of Exposures." *Language Learning* 69, no. 1 (August 27, 2018): 18–43.

Isbilen, Erin S., and Morten H. Christiansen. "Chunk-Based Memory Constraints on the Cultural Evolution of Language." *Topics in Cognitive Science* 12, no. 2 (September 6, 2018): 713–726.

Larrotta, Clarena. "Second Language Vocabulary Learning and Teaching: Still a Hot Topic." *Journal of Adult Education* 40. 1 (2011): 1–11.

Khakim, Lukmanul. "Improving Students' Vocabulary Mastery Through Total Physical Response Learning Method." Atlantis Press SARL, (2019).

Madrigal-Hopes, Diana L, Edna Villavicencio, Martha M Foote, and Chris Green. "Transforming English Language Learners' Work Readiness: Case Studies in Explicit, Work-Specific Vocabulary Instruction." *Adult Learning* 25, no. 2 (2014): 47–56.

McGregor, Karla K. "What a Difference a Day Makes: Change in Memory for Newly Learned Word Forms over 24 Hours." *Journal of Speech, Language, and Hearing Research* 57, no. 5 (2014): 1842–1850.

Pili-Moss, Diana, Katherine A. Brill-Schuetz, Mandy Faretta-Stutenberg, and Kara Morgan-Short. "Contributions of Declarative and Procedural Memory to Accuracy and Automatization during Second Language Practice." *Bilingualism: Language and Cognition* 23, no. 3 (October 1, 2019): 639–651.

Price, Tabitha. "Foundations of MAST: The Importance of Theory Behind MAST" (August 26, 2020).

Rojas-Barreto, Lisseth S., and Marco T. Artunduaga-Cuellar. "Students and Teachers' Causal Attributions to Course Failure and Repetition in an ELT Undergraduate Program." *English Language Teaching* 11, no. 5 (2018): 39.

Samifanni, Faramarz. "The Fluency Way: A Functional Method for Oral Communication." *English Language Teaching* 13, no. 3 (2020): 100.

Soare, Ioan-Laurian, and Maria-Cristina Munteanu-Banateanu. "The 16th International Scientific Conference" ELearning and Software for Education." *eLearning & Software Education* 3 (2020): 485–490.

Słowik-Krogulec, Agata. "Developing Efficient Foreign Language Classroom Environment for Older Adult Learners." *Journal of Education Culture and Society* 10, no. 2 (2019): 189–200.

"SUN." *Bible In Every Language*. Accessed December 13, 2020. https://bibleineverylanguage.org/processes/sun/.

Wang, Meihua. "A Study on the Relationship between Age Onset of English Learning and English Achievement." *Theory and Practice in Language Studies* 5, no. 1 (2015): 164–169.

Appendix

Appendix A

Survey

Microsoft Form for deciding whether a potential candidate should be a participant in this study:
https://forms.office.com/Pages/ResponsePage.aspx?id=CBGqe9tq4kuZzwCkhyqxz6JnVh5Hz5Z
LjQAnwDBLmBhUOTEzRUJDU0REUkZRMTczTFUwTE5MTTlXUS4u

Appendix B:

Pretest/Posttest:

https://docs.google.com/document/d/11AYcIVqpytgJqdEOCSDkFOwWlzJD05Tv/edit?usp=shar
ing&ouid=107068983196341216743&rtpof=true&sd=true

These are the same test. The passage was on a single sheet of paper, double spaced, so that the participants were able to write their definitions below the Spanish words. The scripture used is shown in appendix E.

Appendix C:

SUN Vocabulary Cards

For the study, vocabulary words were chosen in groups of twenty for each lesson. When you click on the link you will be directed to a page that includes the specific SUN cards used for this study.
https://docs.google.com/document/d/1-
78_VN9nNse9W71E_HxYdziuTd2URjQX/edit?usp=sharing&ouid=107068983196341216743&
rtpof=true&sd=true

Appendix D:

Observation Sheet

The observation sheet consisted of one side that has each of the participants names in a row. It will appeared to look as a chart. In each column, there were titles for the instructor to be able to quickly mark whether the participants were showing any of those characteristics. These columns included the titles of engaged, participating in group, willing to try, attempts speaking in Spanish, attempts writing in Spanish, reads the Spanish line for group story.

Appendix E:

2 Peter 1 (Version Biblia Reina Valera)

Salutación
1 Simón Pedro, siervo y apóstol de Jesucristo, a los que habéis alcanzado, por la justicia de nuestro Dios y Salvador Jesucristo, una fe igualmente preciosa que la nuestra:
2 Gracia y paz os sean multiplicadas, en el conocimiento de Dios y de nuestro Señor Jesús.
Partícipes de la naturaleza divina
3 Como todas las cosas que pertenecen a la vida y a la piedad nos han sido dadas por su divino poder, mediante el conocimiento de aquel que nos llamó por su gloria y excelencia,
4 por medio de las cuales nos ha dado preciosas y grandísimas promesas, para que por ellas llegaseis a ser participantes de la naturaleza divina, habiendo huido de la corrupción que hay en el mundo a causa de la concupiscencia;
5 vosotros también, poniendo toda diligencia por esto mismo, añadid a vuestra fe virtud; a la virtud, conocimiento;
6 al conocimiento, dominio propio; al dominio propio, paciencia; a la paciencia, piedad;
7 a la piedad, afecto fraternal; y al afecto fraternal, amor.
8 Porque si estas cosas están en vosotros, y abundan, no os dejarán estar ociosos ni sin fruto en cuanto al conocimiento de nuestro Señor Jesucristo.
9 Pero el que no tiene estas cosas tiene la vista muy corta; es ciego, habiendo olvidado la purificación de sus antiguos pecados.
10 Por lo cual, hermanos, tanto más procurad hacer firme vuestra vocación y elección; porque haciendo estas cosas, no caeréis jamás.
11 Porque de esta manera os será otorgada amplia y generosa entrada en el reino eterno de nuestro Señor y Salvador Jesucristo.
12 Por esto, yo no dejaré de recordaros siempre estas cosas, aunque vosotros las sepáis, y estéis confirmados en la verdad presente.
13 Pues tengo por justo, en tanto que estoy en este cuerpo, el despertaros con amonestación;
14 sabiendo que en breve debo abandonar el cuerpo, como nuestro Señor Jesucristo me ha declarado.
15 También yo procuraré con diligencia que después de mi partida vosotros podáis en todo momento tener memoria de estas cosas.
Testigos presenciales de la gloria de Cristo
16 Porque no os hemos dado a conocer el poder y la venida de nuestro Señor Jesucristo siguiendo fábulas artificiosas, sino como habiendo visto con nuestros propios ojos su majestad.
17 Pues cuando él recibió de Dios Padre honra y gloria, le fue enviada desde la magnífica gloria una voz que decía: Este es mi Hijo amado, en el cual tengo complacencia.
18 Y nosotros oímos esta voz enviada del cielo, cuando estábamos con él en el monte santo.
19 Tenemos también la palabra profética más segura, a la cual hacéis bien en estar atentos como a una antorcha que alumbra en lugar oscuro, hasta que el día esclarezca y el lucero de la mañana salga en vuestros corazones;
20 entendiendo primero esto, que ninguna profecía de la Escritura es de interpretación privada,
21 porque nunca la profecía fue traída por voluntad humana, sino que los santos hombres de Dios hablaron siendo inspirados por el Espíritu Santo.

Appendix F:
Short Spanish Stories

These stories were created based off the vocabulary words taught for each lesson. They directly tie into the vocabulary instruction to help see how the methodology is also impacting retention and comprehension of the language.

https://docs.google.com/document/d/12kxOAWGMAJYr_9HBX1iIQoeIwfe9n6xq/edit?usp=sharing&ouid=10706898319634121674&rtpof=true&sd=true

Appendix G:
Group Story Meanings Sheet

This was a half sheet of paper that was split into two boxes. The left side was used to write down their group's story. The right side was used to write down the meaning of the story that was told by the other group.

https://docs.google.com/document/d/1AwKdc3T8gd7uC7OUNMUcp9xX9VzKeqaW/edit?usp=sharing&ouid=10706898319634121674&rtpof=true&sd=true

Appendix H
Daily Retention Quizzes

These retention quizzes took place from day 2 to 5. These quizzes were quick but had enough on them to show that the participant was or was not able to remember what was taught the previous day.
https://docs.google.com/document/d/1v5FilV26rvGDZ9Ewp8JMEAB_1a5GLBF9LgutP_94k-c/edit?usp=sharing

Appendix I:
TPR Vocabulary Cards for Movements

Essentially this is a document filled with the specific motion for the specific vocabulary word. This will provide opportunity for other researchers to implement the research project because they will be able to easily see how the movements were done and therefore apply it as they teach the vocabulary words. These cards were also used by the participants throughout the study to practice retaining motions.

https://docs.google.com/document/d/1Hq0434G1Pt5-YHdtXQGx0JgZhvSqBN4d/edit?usp=sharing&ouid=10706898319634121674&rtpof=true&sd=true

Appendix J:

Data can be found at the following link:
https://barclaycollege-my.sharepoint.com/:x:/g/personal/gloria_marquez_barclaycollege_edu/ESPuEA1BHwRFrtG_ko lt6AUB93k-56CVqHLw1Qh1eVhSaQ?e=GWAGtp

Appendix K:

After the week study concluded, weekly quizzes had two versions that were sent out to SUN and TPR groups to keep the organization of results. The quizzes were the same including the order in which the quizzes were sent out.

Weekly Quizzes
- Week 1:
  https://forms.office.com/Pages/ResponsePage.aspx?id=DQSIkWdsW0yxEjajBLZtrQAA AAAAAAAAAN__tAK6p1UQ1I5N0paSTRRTEhFTUdZQ0g0QVJSMk5IVy4u

- Week 2:
  https://forms.office.com/Pages/ResponsePage.aspx?id=DQSIkWdsW0yxEjajBLZtrQAAAAAA AAAAAAN__tAK6p1UMk1FTFk4MkNGSEUxQkxRSTdDOE1aNkVMTi4u

- Week 3:
  https://forms.office.com/Pages/ResponsePage.aspx?id=DQSIkWdsW0yxEjajBLZtrQAAAAAA AAAAAAN__tAK6p1UN1o2V0RXVk8zQjhFMVg3NFlBQlJCNUsxNi4u

- Week 4:
  https://forms.office.com/Pages/ResponsePage.aspx?id=DQSIkWdsW0yxEjajBLZtrQAAAAAA AAAAAAN__tAK6p1UNE4xSUpDTDhKOVNBTzlaRzVNME1NVU9HRS4u

Appendix L

Detailed Procedures

It is important to describe that the structure of each week was very similar. The constants between both weeks included the amount of time spent learning the Spanish language, similar environments, the same instructor, the same assessments, and the same activities (e.g. Spanish stories, creating stories, etc.). The only difference was the methodology taught. The methods used were not intertwined in any way. Each of them was used separately and according to the procedures given below. The methods taught were tested through the participants ability to retain and comprehend each day as well as after the week had ended.

1. The study commenced by asking church groups and seminaries if they had attendees that would be interested in learning the Spanish language who had no experience in it or limited exposure. They were also made aware of the fact that it was a research study and that there were two methods used. When reaching out for this study, it was made known that the results acquired were confidential and no harm came from participating in either of the methods. Participants were also made aware that they were not able to select the method and that the study would last five days, taking place for two hours in the evening with a raffle to conclude for those who attended all five days. Participants were also told to not study the language prior to their participation. The conversations were similar to the following: "Hello _____, I will be conducting a study that will take place here at (locations varied). It will be a ten-hour course taught on the Spanish language, meaning it will last five days and will take place between the hours of 5-7:00. This course will run four times, but participants will only be able to attend one of the weeks. Each week will use a different methodology, but the same information will be provided. Participants must know no Spanish or very minimal

Spanish to be able to participate. It is also important that participants do not study the language prior to commencing the study. Also, if someone is interested, they should know it will be crucial to attend the whole week in order to continue to build upon the language. Those who do participate the whole week will be entered into a raffle to receive a gift card! If anyone has any questions, please contact me at (321) xxx-xxxx."

2. After the participants were identified, a survey was sent out to them using a link from Microsoft Forms via email (appendix A). This information consisted of their name, race, age, insight to how much they know of the Spanish language, answers to words and phrases in Spanish, and participant consent; if selected, as well as their contact number.

3. As soon as responses were submitted, participants were notified whether or not they were able to participate in the study based upon the knowledge they already had of the language.

4. Based on responses, the participants were divided in half. Participants who were at the same language acquisition level with no Spanish exposure, were randomly divided into group A and group B. There were also some participants with limited exposure to the language. They were divided equally and randomly placed into the groupings. They were randomly placed by drawing from a hat.

5. Next, participants who have limited exposure to the language have been randomly placed as described in step five, the remainder of the participants' names were placed in a hat. Then, names were drawn to determine the group they were placed in.

6. After all participants were placed, the names TPR and SUN were written on separate pieces of paper and place them into a hat. The first one drawn was group A, the second was group B.

7. To continue, once participants were placed, they received the dates, times, and location that the study took place. The details of each event looked slightly different. In Michigan and Orlando, the event took place in a home. In Nigeria and Ethiopia, the event took place in a classroom setting. All locations had sessions for both SUN and TPR.

Teacher Selection

8. A group of individuals, living near Central Florida were contacted by phone that work or have worked at Wycliffe Associates and have taught the process of SUN prior. Each individual was told the following: "Hello! How are you? (Brief time of catching up). I am calling you to ask if you would be interested in teaching Spanish through SUN and Total Physical Response. It would last two weeks (dates and times would be given). Would you be available at those times? (If yes…) Do you know TPR? (If no…) Would you be willing to learn how it would be used through this course? (If no or yes) Thank you for taking the time to consider being a part of this study! (If they are willing) I will contact you and let you know whether you have been selected as the instructor for this study. Thank you! Have a wonderful day!"

9. During the interview, notes were taken of the responses given by potential candidates. Based on responses given and availability, the instructor was chosen.

10. The candidate chosen did know the method of TPR therefore a two-to-four-hour intensive training course was not held. Instead, we met on what was expected to be done through the course. Since the candidate chosen had previously taught SUN, then the instructor chosen did not need to complete a SUN training that would take about the same as the TPR training.

11. After the details were sorted and the instructor was chosen, the candidate met with me to discuss the layout of the course and the amount of time it would take to achieve it.

Week One: Group A (SUN)

Day One

1. At 5:00, the study commenced. There was an introduction about the instructor, Barclay, and I. No particular details were given about the methodology to prevent specific attention being given to a particular method. Participants gave a brief introduction of themselves (10 minutes).

2. Participants were told they would be taking a Pre-Test. This Pre-Test came from the passage 1 Peter 1. Participants were not told the scripture reference so that they were not able to look it up or practice memorizing it throughout the week. Students were given five minutes to write any words that they were able to recognize (five minutes).

3. Next, direct vocabulary instruction begun. Specific SUN cards were picked out that had direct vocabulary from the scripture passage (see appendix C). Participants were shown the SUN symbol and the Spanish word to go with it. They repeated the word after the instructor and then were given the meaning of the word.

4. After the first five were shown, the instructor reviewed the five having participants state the word and attempt to recall. Then, they proceeded with the next five, and after they reviewed all ten. While introducing the vocabulary, the instructor pulled out any that students did not recall and reviewed those again (seven minutes).

5. Once the initial vocabulary introduction was completed, the instructor gave each partner at each table a set of the ten SUN cards. He allowed them five minutes to practice looking over the cards while also testing each other (five minutes).

6. In continuation, the instructor described how the vocabulary words that had been taught have not been conjugated. Therefore, they were told that they come in different forms.

Participants were shown the various forms of the words on the dry-erase board. (five minutes)

7. Steps three to five were repeated for the next set of ten vocabulary words. When step four was conducted again, the instructor allowed them to look over all twenty vocabulary words (fifteen minutes).

8. Subsequently, the instructor gave each person Spanish story 1 that included the vocabulary words from the lesson (see appendix F). Students worked independently to comprehend the text while writing the meaning of the sentences in English in black pen (seven minutes).

9. Afterwards, the instructor had students put away their black pens and take out their red pens. The table groups worked together to fill in any blank areas that they may still have had. They were also given the opportunity to refer back to the SUN symbols, but without looking at the definition. The red pens symbolized words they have inserted with help from their group or the SUN cards (ten minutes).

10. In continuation, each group shared how much they were able to comprehend and what words they had yet to determine. Instructor gave feedback and encouraged groups (seven minutes).

11. Participants worked with their table groups to create a story using the words they had learned. They were able to use the SUN symbols to help them outline their story. The story had at least one sentence per person in the group. Participants were instructed to have each person in the group to each read a line. They were welcomed to act it out if they chose. The instructor rotated around the room and was available to answer questions. Instructor also took note of any observations at each table (twenty minutes).

12. Each group had the opportunity to present their story in Spanish. Each person in the group stated a line. The groups decided whether they wanted to make it a performance or not. After each group performed, groups sitting at the table wrote down on their Group Story Meanings Sheet what they thought their story was about (see appendix G). Then the group shared what they had intended by their short story, but seated groups were not able to change their written responses. Instructor collected the stories that each group wrote. The process was repeated until all groups had taken a turn (twenty minutes).

13. The last part of class was reserved for any questions (five minutes).

14. Before participants left, the instructor highlighted some of the things they were able to do that day and then reminded them of their meeting time before dismissing (two minutes).

15. At the end of the evening, the instructor looked over the participants work and made note of needs within the class to continue to guide or modify instruction as the days proceeded.

Day Two

16. The instructor welcomed students and explained that they would be taking a short quiz based on the twenty vocabulary words learned from the previous day (see appendix H, five minutes).

17. As a whole group, the twenty vocabulary words were reviewed. The instructor had students say the Spanish word and say the English definition of it right after. If there were any that participants did not remember, they reviewed them again (five minutes).

18. The instructor proceeded by doing steps 3-10 from day 1. The only differences were instead of Spanish Story 1 it was Spanish Story 2 and the opportunity to review all of the vocabulary from both days.

19. Next, participants worked with their table groups to create a story using the words they had learned from both days. They were able to use the SUN symbols to help them outline their story. The story had at least one sentence per person in the group. Participants knew that they each needed to read a line. Individuals were welcomed to act it out if they chose. Instructor rotated around the room and was available to answer questions. Instructor also took note of any observations for each table (twenty minutes).

20. Each group was given the opportunity to present their story in Spanish. Each person in the group stated a line. Groups decided whether they wanted to make it a performance or not. After each group performed, groups sitting at the table will write down on their Group Story Meanings Sheet what they thought their story was about (see appendix G). Then the group will share, but groups were not able to change their written responses. Instructor collected the stories that each group wrote. The process was repeated until all groups had gone (twenty minutes).

21. The last part of class was reserved for any questions (five minutes).

22. Before participants left, the instructor highlighted some of the things they were able to do that day and then reminded them of their meeting time before dismissing (two minutes).

23. At the end of the evening, the instructor looked over the participants work and made note of needs within the class to continue to guide or modify instruction as the days proceeded.

Day Three and Day Four

24. Day three and four looked just like day two. The only differences were that there was new vocabulary each day and then also allowing participants to review all vocabulary. Therefore, day three and four were conducted like day two.

Day Five – Last Day of Using SUN

25. The instructor welcomed students and explained that they will be taking a short quiz based on the twenty vocabulary words from the previous day (see appendix H, 5 minutes).

26. As a whole group, the twenty vocabulary words were reviewed. The instructor had students say the Spanish word and say the English definition of it right after. If there were any that participants did not remember, they reviewed them again (five minutes).

27. The instructor proceeded by doing steps 3-10 from day 1. The only differences were instead of Spanish Story 1 it was Spanish Story 5 and the opportunity to review all of the vocabulary from both days.

28. Next, participants worked with their table groups to create a story using the words they had learned from both days. They were able to use the SUN symbols to help them outline their story. The story had at least one sentence per person in the group. Participants knew that they each needed to read a line. Individuals were welcomed to act it out if they chose. Instructor rotated around the room and was available to answer questions. Instructor also took note of any observations for each table (20 minutes).

29. Each group was given the opportunity to present their story in Spanish. Each person in the group stated a line. Groups decided whether they wanted to make it a performance or not. After each group performed, groups sitting at the table will write down on their Group Story Meanings Sheet what they thought their story was about (see appendix G). Then the group will share, but groups were not able to change their written responses. Instructor collected the stories that each group wrote. The process was repeated until all groups had gone (twenty minutes).

30. Then, the instructor let them know that they were completing their final task. At this time, they took the Post-test that was exactly like their Pre-Test. The groups were not aware that the Pre and Post-Test would be the same (10 minutes).

31. I took time to thank participants for their time and support. They were reminded that for the next four weeks that they would be having a short passage sent to their email for them to work through and send back. After, participants were reminded that you will be doing a drawing for the gift cards. Two winners from each group were selected.

32. At the end of this week, the instructor wrote down final observations.

Week Two: Group B (TPR)

Day One

1. At 5:00, the study commenced. There was an introduction about the instructor, Barclay, and I. No particular details were given about the methodology to prevent specific attention being given to a particular method. Participants gave a brief introduction of themselves (10 minutes).

2. Participants were told they would be taking a Pre-Test. This Pre-Test came from the passage 1 Peter 1. Participants were not told the scripture reference so that they were not able to look it up or practice memorizing it throughout the week. Students were given five minutes to write any words that they were able to recognize (five minutes).

3. Next, direct vocabulary instruction had begun. Vocabulary words chosen from week one will be the exact same for week 2. Instead of using SUN cards, TPR cards were used to apply movement to each vocabulary word based on its meaning (see appendix I). Participants were shown the vocabulary word, they repeated the word after the instructor and then were shown the meaning on the back of the card using the English word. When

participants repeated back the vocabulary word, they did the motion that corresponded with the word.

4. After the first five were shown, the first five were reviewed by having participants state the word and attempt to recall. The instructor then proceeded with the next five, and after reviewed all ten. During the introduction of the vocabulary, the instructor pulled out any of the vocabulary words that students did not recall. Those were reviewed again. Remember, students were completing the same motion each time that they recalled a word (7 minutes).

5. When the initial vocabulary introduction was completed, each partner at the table was given a set of the ten vocabulary word cards. Individuals were given five minutes to practice looking over them and testing each other. Participants were reminded to use the movements as they practice (5 minutes).

6. Following that, the instructor described that the vocabulary words that have been taught have not been conjugated. Therefore, they were told that they come in different forms. Participants were shown the various forms of the words on the dry-erase board. (5 minutes)

7. Steps 3-5 were repeated for the next set of ten vocabulary words. In step fifteen, individuals were encouraged to look over all twenty vocabulary words.

8. Subsequently, the instructor gave each person Spanish story 1 that included the vocabulary words from the lesson (see appendix F). Students worked independently to comprehend the text while writing the meaning of the sentences in English in black pen (seven minutes).

9. Afterwards, the instructor had students put away their black pens and take out their red pens. The table groups worked together to fill in any blank areas that they may still have had. They were also given the opportunity to refer back to the TPR motions, but without looking at the definition. The red pens symbolized words they have inserted with help from their group or the TPR cards (ten minutes).

10. In continuation, each group shared how much they were able to comprehend and what words they had yet to determine. Instructor gave feedback and encouraged groups (seven minutes).

11. Participants worked with their table groups to create a story using the words they had learned. They were able to use the TPR cards and motions to help them outline their story. The story had at least one sentence per person in the group. Participants were instructed to have each person in the group to each read a line. They were welcomed to act it out if they chose. The instructor rotated around the room and was available to answer questions. Instructor also took note of any observations at each table (twenty minutes).

12. Each group had the opportunity to present their story in Spanish. Each person in the group stated a line. The groups decided whether they wanted to make it a performance or not. After each group performed, groups sitting at the table wrote down on their Group Story Meanings Sheet what they thought their story was about (see appendix G). Then the group shared what they had intended by their short story, but seated groups were not able to change their written responses. Instructor collected the stories that each group wrote. The process was repeated until all groups had taken a turn (twenty minutes).

13. The last part of class was reserved for any questions (five minutes).

14. Before participants left, the instructor highlighted some of the things they were able to do that day and then reminded them of their meeting time before dismissing (two minutes).

15. At the end of the evening, the instructor looked over the participants work and made note of needs within the class to continue to guide or modify instruction as the days proceeded.

Day Two

16. The instructor welcomed students and explained that they would be taking a short quiz based on the twenty vocabulary words learned from the previous day (see appendix H, five minutes).

17. As a whole group, the twenty vocabulary words were reviewed by having students say the Spanish word and say the English definition of it right after using the movements taught previously. For those participants that did not remember, the vocabulary was reviewed again with the movements (5 minutes).

18. The instructor proceeded by doing steps 3-10 from day 1. The only differences were that instead of Spanish Story 1 it was Spanish Story 2 and the opportunity to review all of the vocabulary from both days.

19. Participants worked with their table groups to create a story using the words they had learned. They were able to use the TPR cards and motions to help them outline their story. The story had at least one sentence per person in the group. Participants were instructed to have each person in the group to each read a line. They were welcomed to act it out if they chose. The instructor rotated around the room and was available to answer questions. Instructor also took note of any observations at each table (twenty minutes).

20. Each group had the opportunity to present their story in Spanish. Each person in the group stated a line. The groups decided whether they wanted to make it a performance or not. After each group performed, groups sitting at the table wrote down on their Group Story Meanings Sheet what they thought their story was about (see appendix G). Then the group shared what they had intended by their short story, but seated groups were not able to change their written responses. Instructor collected the stories that each group wrote. The process was repeated until all groups had taken a turn (twenty minutes).

21. The last part of class was reserved for any questions (five minutes).

22. Before participants left, the instructor highlighted some of the things they were able to do that day and then reminded them of their meeting time before dismissing (two minutes).

23. At the end of the evening, the instructor looked over the participants work and made note of needs within the class to continue to guide or modify instruction as the days proceeded.

Day Three and Day Four

24. Day three and four looked just like day two. The only differences were that there was new vocabulary each day and then also allowing participants to review all vocabulary. Therefore, day three and four were conducted like day two.

Day Five – Last Day of Using TPR

25. The instructor welcomed students and explained that they would be taking a short quiz based on the twenty vocabulary words learned from the previous day (see appendix H, five minutes).

26. As a whole group, the twenty vocabulary words were reviewed by having students say the Spanish word and say the English definition of it right after using the movements

taught previously. For those participants that did not remember, the vocabulary was

reviewed again with the movements (5 minutes).

27. The instructor proceeded by doing steps 3-10 from day 1. The only differences were that

    instead of Spanish Story 1 it was Spanish Story 2 and the opportunity to review all of the

    vocabulary from both days.

28. Participants worked with their table groups to create a story using the words they had

    learned. They were able to use the TPR cards and motions to help them outline their

    story. The story had at least one sentence per person in the group. Participants were

    instructed to have each person in the group to each read a line. They were welcomed to

    act it out if they chose. The instructor rotated around the room and was available to

    answer questions. Instructor also took note of any observations at each table (twenty

    minutes).

29. Each group had the opportunity to present their story in Spanish. Each person in the

    group stated a line. The groups decided whether they wanted to make it a performance or

    not. After each group performed, groups sitting at the table wrote down on their Group

    Story Meanings Sheet what they thought their story was about (see appendix G). Then

    the group shared what they had intended by their short story, but seated groups were not

    able to change their written responses. Instructor collected the stories that each group

    wrote. The process was repeated until all groups had taken a turn (twenty minutes).

30. Instructor will then let them know that they will be completing their final task. They will

    take the Post-test that was exactly like their Pre-Test. They will not have known that the

    Pre and Post-Test would be the same (10 minutes).

31. Then, the instructor let them know that they were completing their final task. At this time, they took the Post-test that was exactly like their Pre-Test. The groups were not aware that the Pre and Post-Test would be the same (10 minutes).

32. I took time to thank participants for their time and support. They were reminded that for the next four weeks that they would be having a short passage sent to their email for them to work through and send back. After, participants were reminded that you will be doing a drawing for the gift cards. Two winners from each group were selected.

33. At the end of this week, the instructor wrote down final observations.

Weeks After Each Study Conducted

34. Participants received a Short Spanish Story for them to work through each week for four weeks. The participants were told to complete it without help and then send back when complete. These were completed for both groups to see how much was retained from each method (see appendix K).

Appendix M

Comprehension (Daily)

SUN Table

Comprehension				SUN Participants										
Group 1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Short Story Day 1 w/o color (out of 39)	27	21	23	17	12	22	16	30	27	28	28	16	16	14
Short Story Day 2 w/o color (out of 30)	24	18	19	15	14	26	12	27	26	27	24	23	17	15
Short Story Day 3 w/o color (out of 37)	22	19	24	21	17	22	10	25	21	29	25	25	14	14
Short Story Day 4 w/o color (out of 35)	18	22	29	20	21	33	6	17	23	33	21	23	6	13
Short Story Day 5 w/o color (out of 52)	26	23	33	24	18	45	14	32	33	42	40	27	18	18

TPR Table

Comprehension				TPR Participants										
Group 2	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Short Story Day 1 w/o color (out of 39)	24	22	24	17	24	20	31	28	23	13	11	13	21	11
Short Story Day 2 w/o color (out of 30)	21	22	23	22	20	20	25	26	18	19	19	18	22	13
Short Story Day 3 w/o color (out of 37)	22	19	16	19	14	24	30	27	24	16	19	23	18	8
Short Story Day 4 w/o color (out of 35)	14	22	22	16	16	23	30	21	19	18	24	20	15	7
Short Story Day 5 w/o color (out of 52)	31	26	34	28	21	34	35	38	32	18	32	23	28	13

Short Story Quizzes Results: Bar Graph

Participants 1-14 = SUN participants 15-28 = TPR Participants
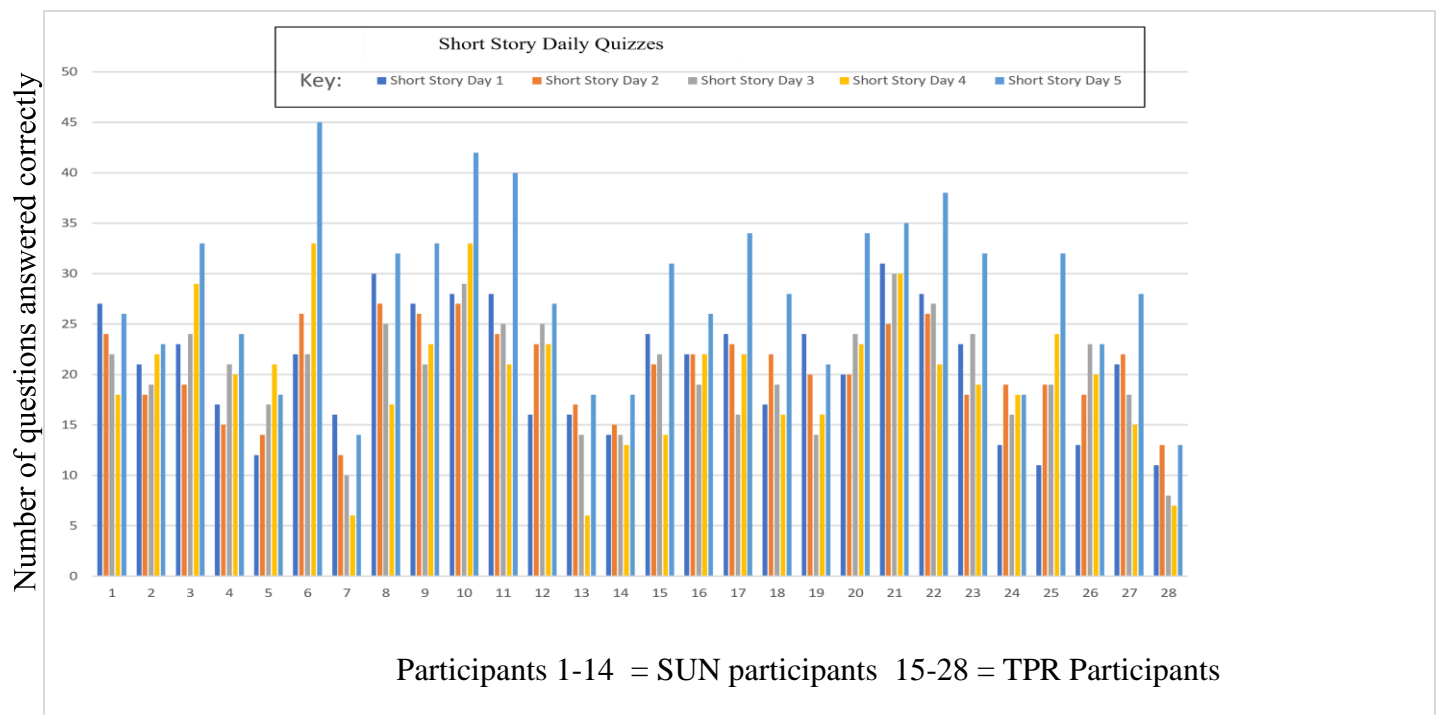
Comprehension and Retention (Shorter Period of Time)
Daily Quizzes

SUN Table

Comprehension and Retention					Participants									
Group 1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
SUN Daily Quiz 1	17	17	18	15	12	19	6	19	17	20	18	20	15	10
SUN Daily Quiz 2	20	20	20	16	16	20	8	15	19	19	18	19	15	13
SUN Daily Quiz 3	19	20	20	17	16	20	3	17	19	19	14	17	9	7
SUN Daily Quiz 4	6	18	17	18	18	20	4	12	14	14	17	15	10	8
*Quizzes are out of 20 points														

TPR Table

Comprehension and Retention					Participants									
Group 2	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
TPR Daily Quiz 1	15	17	20	18	16	17	**19**	19	16	10	10	15	19	10
TPR Daily Quiz 2	14	17	17	20	9	19	20	16	14	11	17	16	20	11
TPR Daily Quiz 3	9	13	18	16	10	13	17	8	15	12	13	16	20	11
TPR Daily Quiz 4	13	16	13	8	12	7	17	7	9	8	11	20	17	6
*Quizzes are out of 20 points														

Line Graph

Participants   1-14 = SUN participants 15-28 = TPR Participants
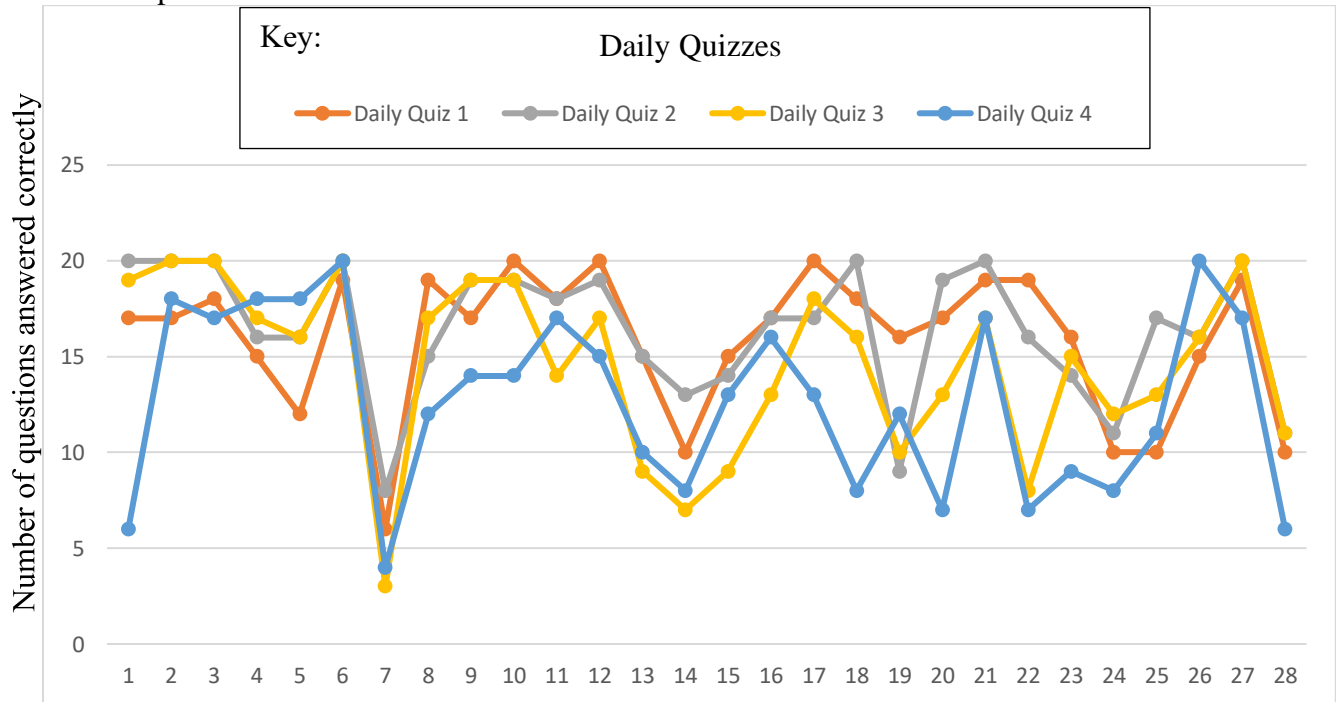
Pretest and Posttest

SUN Table

Comprehension and Retention					Participants									
Group 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Pre-Test (Out of 295)	35	21	29	16	10	26	16	62	15	74	37	7	22	14
Post-Test (Out of 295)	60	114	156	108	52	193	56	185	150	227	177	153	88	65

TPR Table

Comprehension and Retention					Participants									
Group 2	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Pre-Test (Out of 295)	16	52	26	20	18	67	71	28	7	12	23	17	31	23
Post-Test (Out of 295)	133	176	188	157	106	165	250	149	123	91	165	105	142	60

Bar Graph Results
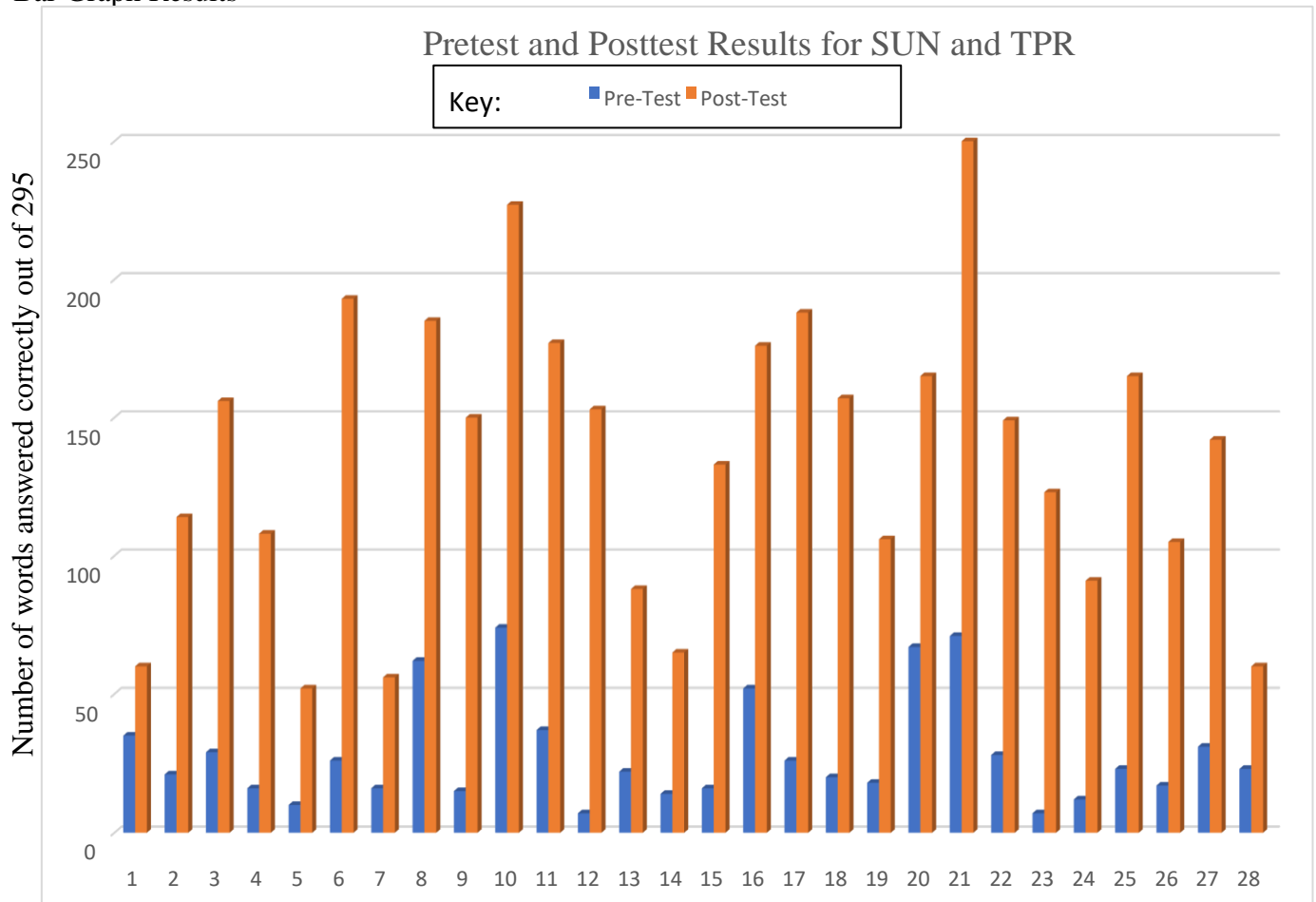
Participants 1-14 =SUN Participants 15-28 = TPR Participants

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Comprehension and Retention (Extended Period of Time)

SUN Weekly Quizzes Chart

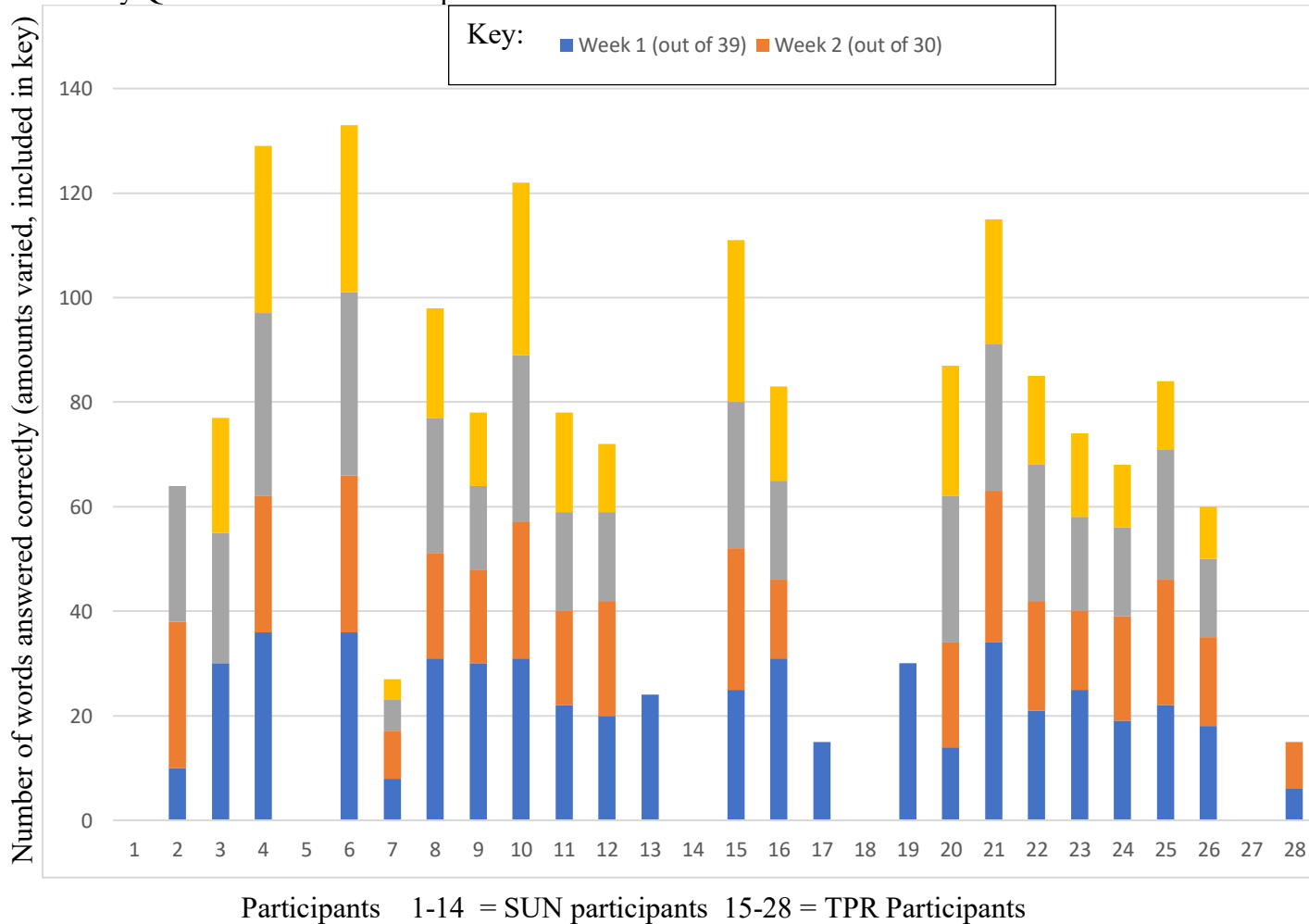| Comprehension and Retention					Participants								
Weekly Quizzes Group 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SUN Week 1 (out of 39)		10	30	36		36	8	31	30	31	22	20	24	
SUN Week 2 (out of 30)		28		26		30	9	20	18	26	18	22		
SUN Week 3 (out of 36)		26	25	35		35	6	26	16	32	19	17		
SUN Week 4 (out of 33)			22	32		32	4	21	14	33	19	13		

TPR Weekly Quizzes Chart

Comprehension and Retention					Participants								
Weekly Quizzes Group 2	15	16	17	18	19	20	21	22	23	24	25	26	27	28
TPR Week 1 (out of 39)	25	31	15		30	14	34	21	25	19	22	18		6
TPR Week 2 (out of 30)	27	15				20	29	21	15	20	24	17		9
TPR Week 3 (out of 36)	28	19				28	28	26	18	17	25	15		
TPR Week 4 (out of 33)	31	18				25	24	17	16	12	13	10		

Key:	
=	did not complete task

Weekly Quizzes Stacked Bar Graph

Key: ■ Week 1 (out of 39) ■ Week 2 (out of 30)

Number of words answered correctly (amounts varied, included in key)

Participants   1-14 = SUN participants   15-28 = TPR Participants

Appendix O- T-Scores

Pretest and Posttest		
t-Test: Paired Two Sample for Means		
	SUN	TPR
Mean	79	89.07407
Variance	4475.077	4613.071
Observations	27	27
Pearson Correlation	0.626035	
Hypothesized Mean Difference	0	
df	26	
t Stat	-0.89783	
P(T<=t) one-tail	0.188759	
t Critical one-tail	1.705618	
P(T<=t) two-tail	0.377518	
t Critical two-tail	2.055529	

Daily Quizzes		
t-Test: Paired Two Sample for Means		
	SUN	TPR
Mean	15.3809524	13.7142857
Variance	2.82823129	4.14795918
Observations	3	3
Pearson Correlation	0.99579661	
Hypothesized Mean Difference	0	
df	2	
t Stat	7.33799386	
P(T<=t) one-tail	0.0090348	
t Critical one-tail	2.91998558	
P(T<=t) two-tail	0.01806959	
t Critical two-tail	4.30265273	

Short Story Quizzes		
t-Test: Paired Two Sample for Means		
	SUN	TPR
Mean	22.375	21.9107143
Variance	14.4298469	17.2461735
Observations	4	4
Pearson Correlation	0.99120103	
Hypothesized Mean Difference	0	
df	3	
t Stat	1.46261427	
P(T<=t) one-tail	0.11987597	
t Critical one-tail	2.35336343	
P(T<=t) two-tail	0.23975195	
t Critical two-tail	3.18244631	

Weekly Post Quizzes		
t-Test: Paired Two Sample for Means		
	SUN	TPR
Mean	22.2333333	20.2703704
Variance	1.7645679	4.70078189
Observations	3	3
Pearson Correlation	0.99999438	
Hypothesized Mean Difference	0	
df	2	
t Stat	4.04863356	
P(T<=t) one-tail	0.02796883	
t Critical one-tail	2.91998558	
P(T<=t) two-tail	0.05593765	
t Critical two-tail	4.30265273	