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Cyberreading Workstations: The Pandora's Vocabulary Teaching Strategy for Elementary Mexican-American Students in South Texas

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Abstract: Children who enter school with limited vocabulary find reading, difficult, resist reading, learn fewer words, and consequently fall further behind. Historically, Mexican-American students have experienced the lack of vocabulary in English in elementary years. Using Ekiaka & Feng (2011) experimental cyberlearning workstations frame, an experimental study was conducted to examine if vocabulary acquisition through systematic cyberreading instruction is more effective for 48 digital native Mexican-American elementary students in South Texas. Despite limitations, data analysis suggested that teaching English vocabulary through implementation of cyberreading workstations approach had significant impact on participants' vocabulary acquisition processes in comparison to the traditional teaching strategies.

Key words: cyberlearning workstations model, cyberreading workstations, digital natives

1. Introduction

The achievement gap between white and Hispanic students is profound in many school districts. Recent census estimates show that nearly two-thirds of Hispanics in the United States identified themselves as originating from Mexico. Concentrations are particularly high in Border States like California, Arizona, and Texas, where educational attainment among Hispanics is lower than the national average (Richards, 2011).

The achievement gap between Hispanic students, especially Mexican American ones, and their white counterpart has historical roots. In Texas, the educational disparities were very apparent after the ratification of the treaty of Guadalupe Hidalgo annexing Texas to the United States by the U.S. Congress in 1845. After more than 165 years, the same disparities continue to be apparent at elementary level today. Data gathered by the National Assessment of Educational Progress (2007) suggested that by the time children reach fourth grade, large and persistent gaps have opened between Hispanic and white children in both math and reading. The gap widens in the middle school years and continues through the high school years.

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In fact, reading failure is not only an educational concern, but a significant public health problem as well (Honig, Diamond & Gutlohn, 2008), since it is a vector of delinquency and anti-social behaviors' development. Claim (Lopez et al., 2007) has been made that poor reading performance in elementary school is strongly linked to school dropout and a wide variety of anti-social behaviors such as gang membership in middle and high school years.

Recent studies (U.S. Department of Education, 2008; U.S. Department of Justice, 2006) suggested that the connection between reading failure and poor academic performance, school dropout, delinquency, violence, and crime is intrinsic. Statistics from U.S. Department of Education (2008) demonstrated that two-thirds of students who are not able to read proficiently when they finish their 4th grade will end up either in jail or on welfare. A 2006 National Report from the Office of Juvenile Justice and Delinquency Prevention indicates that the number of Hispanic youth in the juvenile justice system is expected to increase significantly over the next several years. Additional research by The Alliance for Excellent Education (2007) indicates that for every Hispanic student who is enrolled in college, there are 2.7 that are currently incarcerated.

There are several factors that put students, from low SES backgrounds, at risk for reading failure. Recent research (Honig, Diamond & Gutlohn, 2008) suggested that poor and/or inappropriate reading instructional strategy is one of the three main sources of reading failure and risky behaviors development for non-special education children. Likewise, traditional and modern reading teaching strategies are rarely technology-driven, despite the increasing number of digital and cyberlearning resources for PK-12 students claiming to be highly effective in developing students' reading and academic skills.

In fact, the introduction of technologies, multimedia, web-based learning — oriented electronic and digital media into formal (classrooms) and informal (families) teaching processes has radically changed the way children and adults learn (November, 2010; Prensky, 2010 & 2012). Tool-used culture and technocrat adults from low SES communities are rapidly prompted into technopoloy's way of being and thinking (Postman, 1992).

The effectiveness of learning-oriented electronic and digital media resources in fostering meaningful learning experiences is even more perceptible for children who come from disadvantage homes who lack access to quality childcare or preschool (Jusoff & Sahimi, 2009). Some scholars (Bavelier, Green & Dye, 2010; Jusoff & Sahimi, 2009; Pempek, Kirkorian, Richards, Anderson, Lund, & Stevens, 2010) suggested that educational video games, DVDs and web-based learning materials could play an important role in literacy, numeracy, and overall cognitive development for children born and raised in poor and low-educated families. Because, electronic and digital media are more than affordable and easy ways to make learning fun, to turn play time into education time. Therefore, many child development experts believe that the qualities inherent in some electronic and digital media resources — such as interactivity, repetition, and the ability to customize content — have tremendous potential as learning tools (Jusoff & Sahimi, 2009; November, 2010; Pempek, Kirkorian, Richards, Anderson, Lund, & Stevens, 2010).

If some learning-oriented electronic and digital media and resources stimulate learning and motivation (Ekiaka & Feng, 2011; Prensky, 2010 & 2012; Pempek, Kirkorian, Richards, Anderson, Lund, & Stevens, 2010) and has the potential to be considered as revolutionary and multiplicative (Toyama, 2010) learning tools; the authors contend that systematic and intensive cyber-learning instructional practices, under transformative parental leadership in informal learning settings, are more likely not only to enhance low SES and at-risk students' reading performance, but also to prevent and/or modify gang membership behaviors.

Given the fact that Mexican American students are enduring challenges due to their limited reading competences and vocabulary, a comparative analysis of teaching reading strategies was conducted to examine if vocabulary acquisition through intense cyberreading workstations approach is more effective in comparison to traditional learning methods (paper pencil method).

Thus, the purpose of this experimental study was to test the effect of intensive cyberreading workstations on elementary Mexican-American students (3rd & 4th graders) in South Texas through examination of the following working hypothesis: Some studies (Jusoff & Sahimi, 2009; November, 2010; Pempek, Kirkorian, Richards, Anderson, Lund, & Stevens, 2010; Toyama, 2010) have suggested that some digital media resources have tremendous potential as learning tools. From the aforementioned research conclusion, the authors contend that systematic and intensive cyberlearning instruction in informal settings will likely improve at-risk students' academic vocabulary over a reasonable period of time. At this stage, cyberreading workstations model is an application of the experimental cyberlearning workstations pedagogical frame in the area of reading and vocabulary.

Certainly, findings from this research project might inform educational administrators, teachers of Mexican American students and Mexican-American parents about some innovative vocabulary teaching strategies grounded on the cyberlearning workstations pedagogical model when teaching vocabulary to digital native elementary students in rural South Texas.

To help our readers better understand the structure of this article, the next segment will provide an overview of the notion of experimental cyberlearning workstations frame before describing the research method. Afterwards, findings and implications will be discussed.

2. Notion of the Experimental Cyberlearning Workstations Frame

As suggested above, this study used Ekiaka & Feng's (2011) cyberlearning instructional frame to explore this topic of inquiry in the area of vocabulary acquisition.

In fact, Ekiaka & Feng's (2011) experimental cyberlearning workstations pedagogical model is grounded on Campbell's (1991) learning centers theory, Gonzalez, Moll & Amanti's (2005) notion of funds of knowledge, the digital videogame and information learning theoretical tenets (Collin & Halverson, 2009; November, 2010; Prensky, 2001, 2010 & 2012), and recent research findings from fitness and academic performance postulates (Cocke, 2002; Dwyer, Coonan, Leitch, Hetzel, & Baghurst, 1983; Tremblay, Inman, & Willms, 2000; Shephard, 1997).

In his quest to maximize his students' learning potential, Campbell (1991) proposed an application of Gardner's (1983, cited in Campbell, 1991) multiple intelligences theory. The basic tenet of Campbell's (1991) learning centers relies on students' intrapersonal and interpersonal differences, with respect to readiness, culture, interest, language, intelligence, gender, learning styles, abilities, developmental level, and experiences. Meeting individual needs is a challenging and demanding responsibility for diverse classroom teachers. Targeting the development of these seven intelligences within a classroom requires an individualizing and differentiating instruction that allows each student to work at his/her own developmental level, cooperate with others and develop a sense of shared responsibility within the classroom.

Campbell's (1991) learning centers were first advanced in the 1990's, and are still very popular in many schools. Observational data, collected by the authors during the last two academic years, suggested that in several South Texas elementary schools applications of the learning centers are seldom technology-driven, despite the availability-oriented electronic and digital media as well other resources can be claimed to be highly effective in stimulating and motivating learning.

In today's digital area, the systematic use of digital technologies and devices such as the XBOX 360 Kinect, Nintendo DS and Nintendo Wii, are widely used in many households (even in low Social Economical Status —

SES — communities) for children's entertainment. Utilizing them within the classroom is a culturally responsive teaching strategy which provides multiple occasions for experimentation. There are multiple opportunities to fail and overcome that malfunction in different domains. From the funds of knowledge (Gonzalez, Moll & Amanti, 2005), integration of digital technologies into classrooms calls for the incorporation of today's K-12 digital native children's culture into learning modules to promote quality culturally responsive education.

It also means that children will have more than one domain in which they may achieve success in an environment with very low anxiety and where errors are not dealt through the form of punishments. This process leads to augmenting student's self-esteem. These learning-oriented electronic and digital media and resources are considered potentially revolutionary and multiplicative learning tools. The systematic use of these digital devices may well increase students' academic achievement, since the teacher will take advantage of today's digital native students' cultural funds of knowledge in order to effectively teach them.

Ekiaka and Feng's (2011) data confirms Gonzalez, Moll & Amanti's (2005) and Prensky's (2001, 2010 & 2012) findings regarding today's teachers' attitude and perceptions toward lived experiences of digital native students. Typically, most teachers have very little appreciation for these new digital skills and experiences that today's students bring into the classrooms. They do not yet believe that their students can learn successfully through the systematic use of learning-oriented electronic and/or digital media. Furthermore, most digital immigrant teachers assume that some instructional strategies, such as Campbell's learning centers (1991), that effectively worked for teaching elementary students in the 1990's will produce the same learning outcomes for today's digital native students.

The last foundations of this adopted experimental cyberlearning workstations pedagogical model come from the research findings in physical fitness and academic performances. Some studies (Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001; Dwyer et al., 1983; Grissom, 2005; Linder, 1999; Linder, 2002; Shephard, 1997; Tremblay et al., 2000) suggested that there is a consistent positive association between overall fitness and academic achievement.

This relationship between physical activity and academic performance has been explored through several studies sponsored by the California Department of Education. These studies support one another in suggesting that when a substantial amount of school time is dedicated to physical activity, academic performance meets and may even exceed that of students not receiving additional physical activity (Shephard, 1997).

In fact, youth receiving additional physical activity tend to show improved attributes such as increased brain function and nourishment, higher energy/concentration levels, changes in physical body structure, increased self-esteem, and better behavior, which may all support cognitive learning (Cocke, 2002; Tremblay, Inman, & Willms, 2000; Dwyer, Coonan, Leitch, Hetzel, & Baghurst, 1983; Shephard, 1997).

Improved brain attributes associated with regular physical activity consist of increased cerebral blood flow, changes in hormone levels, enhanced nutrient intake, and greater arousal (Shephard, 1997). Furthermore, Cocke (2002) suggested that regular exercise can improve cognitive function and increase levels of substances in the brain that are responsible for maintaining the health of neurons. Brain function may also benefit indirectly from physical activity due to increased energy generation, as well as from physical activities inside and outside of the classroom.

The increased energy levels and time outside of the classroom may give relief from boredom resulting in higher attention levels during classroom instruction (Linder, 1999). This justifies the inclusion of some digital devices, such as the XBOX 360 Kinect and the Nintendo Wii as learning tools aimed at providing students with the opportunity to perform physical movements while playing digital educational videogames within the classroom.

Consequently, the main characteristics of Ekiaka & Feng's (2011) experimental cyberlearning workstations pedagogical model consists of the systematic and intensive use of learning-oriented electronic/digital technologies/devices — namely the use of laptops + Internet, Smart buddy devices, digital touch screen (such as ipads, digital tablets and smart phones) Nintendo DS, Nintendo Wii, and XBOX 360 Kinect, play station, play station vita- and digital videogame curriculums and 3D virtual world environments to deliver content-area in K-12 classrooms. Most of these digital technologies are commonly used for children's home-based entertainment.

Each cyberreading instruction session lasts a minimum of 80 minutes and maximum of 120 depending on each teacher's lesson plan. Under optimal fidelity conditions, students are divided into 4 to 6 teams of 2 to 4 students per team. There will be 4 to 6 workstations in each cyberreading classroom. Students will spend a minimum of 15 to 20 minutes in each cyberreading workstation scheduled learning activities.

A cyberreading workstations instruction is a team teaching. There will be one Lead-instructor and 4–6 associate instructors or team leaders (one in each workstation) previously trained by the lead-instructor. Associate instructors or team leaders will be in charge of monitoring and supervising learning activities under the supervision of the lead-instructor.

Before moving to the next cyberreading workstation, students must take the test or quiz which is built into each module. The results will be automatically recorded in the digital videogame's performance center. As stated previously, a brief group introduction at the beginning and a brief conclusion the end of each session are mandatory.

Analysis of Ekiaka & Feng's (2011) research design plans suggests the distinction between conventional and transformative instructional strategies that teachers can apply when working with today's digital native students. In conventional cyberlearning workstation classrooms, instructions are delivered exclusively in a formal learning setting, while in a transformative cyberreading workstation, students receive instructions in formal classrooms-based setting, but they are granted access to certain digital lessons for further practices in an informal setting alongside or under the supervision of parents or guardians.

The aforementioned scholars delineated certain conditions of the cyberlearning workstations pedagogical model for optimal utilization and these conditions must be met before program is systematically implemented: (1) each treatment group size must not exceed 24 participants and must be divided into teams of 2 to 4 students. The model is suitable for grades 2 and higher; (2) the Lead-teacher must plan to set up 4 to 6 cyberreading workstations for daily teaching, (3) the instructional period for each lesson must span from 80 minutes to 120 minutes (depending on grade level). Students must spend an average of 15–20 minutes at each workstation; (4) team-teaching: there must be one lead-instructor and 4–6 associate instructors or team leaders in each classroom. Students might take turns being team leaders. The team of instructors must meet weekly for planning, assessment, and evaluation purposes, (5) the Lead-instructor should at least be familiar with the theoretical tenets of the cyberreading workstations pedagogical model and be well trained in its effective implementation within a regular classroom, and (6) a readily availability variety of digital technology devices and web-based cyberreading software, as well as laptops and the internet are crucial. This availability is necessary in the formal classroom setting as well as in the informal, home environment where parental supervision will be available as well.

For an informed reader of digital information learning literature aimed at rethinking education in the digital age, the experimental cyberreading workstations pedagogy is promising research-based instructional strategy that some visionary K-12 institutions are attempting to implement. Certainly, from the above instructional frame, the assessment and grading system is different than the conventional K-12 classroom. Rather than receiving grades, students achieve levels of expertise, denoted on their report cards as "pre-novice", "novice", "apprentice", "senior", and "master" (Corbett, 2010).

As suggested above, the fidelity of instituting experimental cyberreading workstations is contingent upon the school district's ability not only to afford the start of art digital technology widely used for children's home entertainment, but also to systematically train teachers and school administrators in very specific third-order curriculum changes which must in order to properly utilize the educational videogame structure as core curriculum as opposed in order to meet the needs of today's digital native students.

3. Methods

Given the nature of this topic of inquiry and the main research objective set by the authors, the experimental research strategy was most suitable in order to reach the research objective and also to test the working hypothesis. The classic experimental design specified an experimental group and a control group. The independent variable was administered to the experimental group and not to the control group, and both groups were measured on the same dependent variable. In this quantitative research, researchers did not influence or manipulate any variables (such as that conducted in an experimental-laboratory setting). Instead, we looked for and measured the correlation between them where "digital cyberreading resources" was considered the independent variable (IV), and "vocabulary acquisition" was measured as the dependent variable/outcome (DV).

A convenient sample of Mexican American students participating in an afterschool program at an elementary school in South Texas were asked to take part in this study. Participants were identified and selected by the school based on one the following criteria: (1) students must be from low SES families, qualified for free meals/lunch, and have reading difficulties (reading below grade level); and (2) must be of Mexican American descent. They were assigned to cyberreading workstations or traditional teaching sessions twice per week (Tuesday and Thursday from 4:30 p.m.–6:00 p.m.) during late fall of 2011 and the spring semester of 2012. Data collection started after Institutional Review Board application (IRB) was approved by the University.

Data was collected through an experimental process which included two groups: the experimental (also designated as the treatment group) and the control groups. Participants were assigned to either group by PI. The experimental group received vocabulary instruction using Ekiaka & Feng's (2011) experimental cyberlearning workstations pedagogical model (see previous section). Since all the cyberlearning activities, aimed at improving the experimental group's vocabulary acquisition competences, the PI updated Ekiaka & Feng (2011) cyberlearning workstation pedagogical frame by creating 6 cyberreading workstations for the experimental classroom. There were 6 workstations in this cyberreading classroom: silent cyberreading and radio reading workstation; spelling bee cyberreading workstation; cyberreading vocabulary game workstation; peer reading cyberreading workstation; cyberreading vocabulary comprehension workstation; digital reading performance (drama studio).

It is worth underlining that treatment lesson plans for both groups were designed by a paid consultant paid in collaboration with the faculty sponsor. The content of the majority of cyberreading workstations were drawn from some cyberlearning resources widely adopted by school districts in Texas and other States as supplemental reading resources such as brainpop, ticket to read, brainchild and my word coach. Given the scarcity of educational materials to be displayed in the workstations that used Nintendo Wii and XBOX 360 Kinect as medium of instruction, the lesson plans included hands-on vocabulary reading activities and games in such way that the Nintendo Wii and XBOX 360 Kinect were practically used as reward and motivational tools aimed at fostering reading motivation and engagement within each team.

The control group consisted of 24 students (12 third graders and 12 fourth graders) who received no cyberreading instruction. In contrast, the comparison group acquired new vocabulary words via traditional means:

memorization, repetition, silent reading, reading aloud and pair reading. Participants in the comparison group were then sub-divided into 6 teams of 4 students each.

In contrast, the experimental group consisted of 24 students (12 third graders and 12 fourth graders) who received vocabulary instruction through a cyberreading workstation program and additional cyberreading activities supervised by parents/guardians. Contrary to the original plan of offering treatments to both groups for 120 minutes per session, the cyberreading and traditional instruction lasted 90 minutes per session, twice per week, and was led by the PI. This modification was due to the afterschool program policy of ending all afterschool program activities by six o' clock to allow timely pick up of the children.

According to the basic tenets of the experimental cyberlearning workstations pedagogy, there must be one associate instructor or team leader in each cyberreading workstation. Associate instructors or team leaders included graduate students majoring in bilingual education, who volunteered to assist the PI in this process during the fall semester of 2011 and spring semester of 2012. Similarly, the PI was also assisted by some pre-service teachers and graduate students. Associate cyberreading instructors were responsible for monitoring and supervising the learning activities at their respective workstation which followed the specific learning objectives of the scheduled treatment lesson plans. They were not responsible for data collection. Participants were divided into six teams of four members in each group. At the beginning of each cyberreading workstation treatment session, the lead-instructor introduced the learning objective and assigned an initial workstation to each team.

Participants spent 15–18 minutes in each cyberlearning workstation, working on vocabulary content areas according to the lesson plan. After working for 15–18 minutes in a workstation, each team was asked to move clockwise to the next workstation. At the end of the session, the lead-instructor wrapped up the instruction according to the scheduled lesson plan. It is important to highlight again that sessions in both groups lasted 90 minutes per session and were scheduled twice per week, for a total of 180 minutes per week. Cyberreading participants were also asked to participate in home-based cyberreading activities for at least 120 minutes under parent/guardian/supervision and at a self-paced home-based silent cyberreading for 140 minutes per week.

The PI also asked the comparison group to participate in home-based traditional reading activities for 120 minutes under assigned parent/guardian/supervision and at a self-paced voluntary reading activity, under pre-service teachers' supervision. Assessments (pre/post-tests) were conducted during regular cyberreading classes using traditional testing techniques by which students use paper and pencil to complete the tests. Assessments lasted approximately thirty to forty minutes. To protect the welfare of the children, each participant was assigned a "number" from the beginning of the project for data collection and analysis purposes. Trustworthiness of the research findings was addressed through: peers with strong background in statistics and the faculty advisor review during the data analysis and interpretation processes. In addition, the emerging conceptualizations after the statistical analysis of variance (within and between groups) were shared with two faculty experts in statistical analysis. It is worth noting that contrary to the PI's original research plan, the treatment delivery time was reduced due to an external factor: budget cuts which abruptly forced the PI to speed up the research project.

As it is well-know, no research is perfect. After conducting this study and before presenting the research findings, it is imperative to pinpoint some limitations:

(1) Experimenter bias as an internal threat to validity. Given the fact that the PI who acted as lead-teacher, assessment designer and data collector, there might be the risk of experimenter's bias toward the expected outcomes. Also, the PI's familiarity with the project might also suggest the presence of the following four types of experimenter bias: background (previous experience) bias, assignment of participants into groups' bias,

expectation bias and assessment instrument bias.

(2) The nature of the afterschool program as another external threat to validity. Conducting an educational experimentation means following the research protocol. In this case, some participants who were tested in the pre-test did not attend all the treatment sessions. In several occasions, some parents picked up their children early which did not allow these students (in both groups) to complete their assigned treatments. The PI was not able to control this type of situation. Moreover, there was a research site policy of ending all afterschool events by 6:00 pm to allow time for these children to get picked up. Such policy mandated the lead-teacher or PI to adjust the original plan of treatments for both groups from 120 minutes per session to 90 minutes per session, (twice per week) for a total of 180 minutes of formal treatments per week instead of 240 minutes as originally designed.

(3) Research design limitation: There were several research events that were occurring while on the field related to participants' learning motivation, enthusiasm, engagement, curiosity that could not be captured through an the experimental design exclusively.

4. Findings

To activate participants' prior knowledge, the lesson plans included selected characters from different cartoon themes that the students are familiar with. Ten themes were generated and were integrated into the lesson plans for both groups: control and experimental. Each session included a new theme and vocabulary words. The list of vocabulary words was suggested by the School principal and was divided into ten units. The following table summarizes the list of themes included in the lesson plans.

Table 1 Theme Table with Vocabulary Words

Unit 1 — ***Wizards of Waverly Place:*** chuckle, nervous, nonsense, fumbled, trudge, audition, adventure, exploring, sparkling, fantastic, success, donate, unaware, member, contribute, passion, bothering, admire, concentrate, ached, splendid, separate, determination, storage, exact, ruined, lucky
Unit 2 — ***Toy Story:*** sidewalk, grumbled, trader, blossomed, wailed, lonesome, disappear, protect, harm, supply, enclosure, culture, communities, immigrant, established, traditional, tour, volunteer, thrilled, slogan, deserve, appliances, owners, construction, equipment, leaky, project
Unit 3 **— *Cat in the Hat*:** talented, single, proper, excitement, acceptance, useful, crackle, starry, announced, soar, noticed, estimate, focus, record, instance, illustrate, style, texture, sketches, suggestions, annual, potential, expensive, politely, wrapping, innocent
Unit 4 — i ***Carly:*** beam, argued, possessions, fabric, purchase, quarreling, brilliance, affection, pleaded, exhausted, guarantee, preparations, utilize, awareness, pollution, emphasize, anxious, cross, managed, alarmed, pretend, unfortunately, decisions, communicate, essential, responsible, research, specialist
Unit 5 **— *Avatar*:** fierce, echo, shuffles, huddle, junior, down, architects, structures, contain, retreat, shallow, shelter, crucial, adjust, survive, source, unpredictable, conversation, interrupted, boasting, scrambled, seized, rebuild, sight, odor, venom, female, related, identical
Unit 6 — ***Sponge Bob*:** guests, banquet, agreeable, curiosity, gaze, untrusting, decorated, symbol, darkened, gnaws, secure, weakest, insightful, technique, majority, investigate, cunning, magnificent, masterpiece, ingredient, recipes, tasty, tradition, depart, suitable, increase, observe, advised, discouraged
Unit 7 — ***Superheroes*:** opportunities, border, union, strikes, boycotts, citizen, curious, policy, ranged, temporary, several, frequently, identified, enterprising, persistence, venture, endless, realistic, sensible, protested, paralyzed, display, peculiar, positive, selecting, consisted, advanced, aware
Unit 8 **— *Magical Kingdom*:** weekday, slithered, genuine, apologize, harmless, ambulance, neglected, appreciated, misunderstood, desperate, endure, obedience, dismiss, interact, motivate, conceive, definition, selfish, cranky, commotion, exasperate, specialty, famished skyscraper, collage, barbecue, glorious, strutting, swarm
Unit 9 **— *Star Wars:*** acquaintance, jumble, scornfully, logical, route, investigate, solitary, territory, communication, nutrient, prehistoric, electrical, fuel, globe, decay, anticipation, enormous, encourage, slender, release, glance, unstable, applaud, headline, hoist, assured, assemble
Unit 10 — ***Rock Stars*:** shimmer, eerie, lurk, climate, silken, lumbering, interfere, awkward, proclaimed, agile, guardian, convinced, roamed, completed, journey, natural, relocated, reef, partnership, current, eventually, brittle, suburbs, rumbling, unique, dove, massive, tangles, encounter

4.1 Treatment Strategies

It is worth noting that the reading instructional strategies for both groups (control and experimental) were different. The experimental group received reading instruction under the experimental cyberlearning pedagogical model (see previous chapter). The table below includes a lesson plan for the control group.

Table 2 Control Group Lesson Plan Sample

Grade/Class/Subject: 3rd grade ESL-Reading

Unit/Theme: Star Wars

Language Objective(s): Student will be able to reiterate key vocabulary and their application to everyday life

Key Vocabulary Acquaintance, Jumble, Scornfully, Logical, Route, Investigate, Solitary, Territory, Communication, Nutrient, Prehistoric, Electrical, Fuel, Globe, Decay, Anticipation, Enormous, Encourage, Slender, Release, Glance, Unstable, Applaud, Headline, Hoist, Assured, Assemble	**Supplementary Materials** Star Wars Books Star Galaxy Game Paper Pencils	
Star Wars Galaxy Game		
Directions: Students will be given an opportunity to Spell a ward that is drawn from a jar. If the student spells it correctly he/she will have the opportunity to throw the starship from the first line which is closer to the board. If the student does not spell the word correctly he/she must throw from the second line which is further from the board. The student with the most points wins the game.		

Contrary to the control group, the selected students for the experimental group received vocabulary instruction using cyberlearning workstations frame The main characteristics of Ekiaka & Feng's (2011) experimental cyberlearning workstations pedagogical model consists of the systematic and intensive use of learning-oriented electronic/digital technologies/devices — namely the use of laptops + Internet, Smart buddy devices, Nintendo DS, Nintendo Wii, and XBOX 360 Kinect- and digital videogame curriculums to deliver content-area in K-12 classrooms. Most of these digital technologies are commonly used for children's home-based entertainment. The figure below illustrates the cyberreading classroom dynamic:

Figure 1 Cyberreading Workstation Model

Table 3 Experimental Group Lesson Plan

Grade/Class/Subject: 3rd grade ESL-Reading
Unit/Theme: Star Wars
Language Objective(s): Student will be able to
Reiterate key vocabulary and their application to everyday life

Key Vocabulary		**Supplementary Materials**	
Landscape Observed Planet Defeating Dangerous	Diligent Mixture Diminish Indispensable Perimeter	8 Laptops with Headsets 4 Screens 6 Camcorders 4 Study Buddies with Headsets 4 Brainpop	Big Screen 4 Stands Nintendo Wii Xbox 360 Star Wars Book 

Time:	**Workstations**
15–18 minutes	**Silent and Radio Reading:** Star Wars (Reading Level:, Chapters 1 & 2 pages) <u>Description:</u> Teachers will set the timer for 20 minutes, and students will begin/continue reading the book-Reading Star War Passage-Silent reading (Practice Trail)-Reading Aloud that is being recorded-View video
15–18 minutes	**CR Comprehension: (Brainpop)—**Reading logs/<u>Description:</u> Students will fill out their Character Development Reading Log. Students will engage in Brainpop software
15–18 minutes	**CR Vocabulary Games:** **Scramble words to form a sentence/**<u>Description:</u> Students will receive words and must form a complete sentence. The first person to finish will be granted playing time on X-box.
15–18 minutes	**Spelling Bee CR:** **Spelling and listening activities/**<u>Description:</u> Teacher will write the word on P.C. reproducing the phonological pronunciation. Students will utilize auditory skills to reproduce phonological pronunciation. Students will practice spelling words on writing board. Winner will be granted playing time on Wii.
15–18 minutes	**Buddy CR:** Language Arts/<u>Description:</u> Author's Purpose exercise: Students will engage in a reading unit to acquire a writer's purpose. Vocabulary exercise: Students will use context to understand word meaning
15–18 minutes	**Digital Reading Performance (Drama Studio)/**<u>Description:</u> Teacher will provide students with a star war skit that includes vocabulary words Students will be assigned a star war character. Students will act out to the skit. Students will be videotaped and will review the recording

Assessments (pre and post) were conducted during regular cyberreading classes. That is, assessments took place in a regular afterschool classroom through the cyberreading workstation approach, using traditional reading test techniques where students use paper and pencil to complete the tests. It was designed by the lead-teacher, and consisted of 25 words that were selected from a vocabulary list from the school. This list consisted of all vocabulary words that all third and fourth graders are required to master throughout the entire school year.

For assessment purposes, the PI coded the 24 students (12 females and 12 males) in the control group starting with SC1 up to student 24 as SC24. The same application was applied to the experimental group in which student 1 was labeled SE1 and continued up to student 24 as SE 24 (12 females and 12 males). Also, the coding process was performed according to participants' age not their grade because the content that was delivered was not grade-related, but age-related with inclusion of vocabulary words provided by the school.

Descriptive statistics such as mean, standard deviation, and ANOVA were used to analyze data. The figures below summarize the learning performance between both groups.

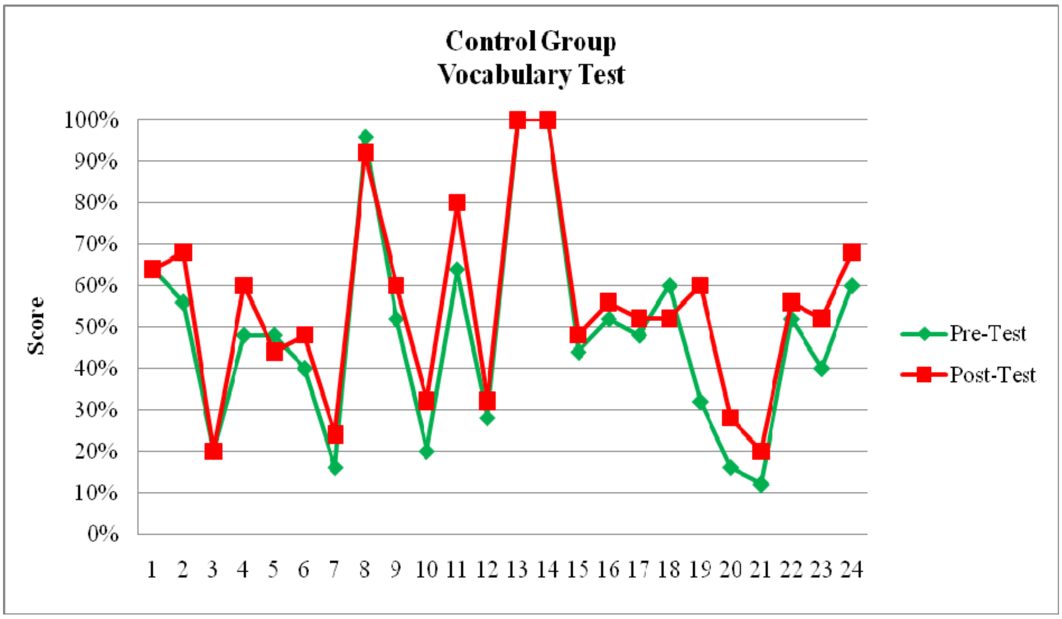

Figure 2 All Scores for Control Group

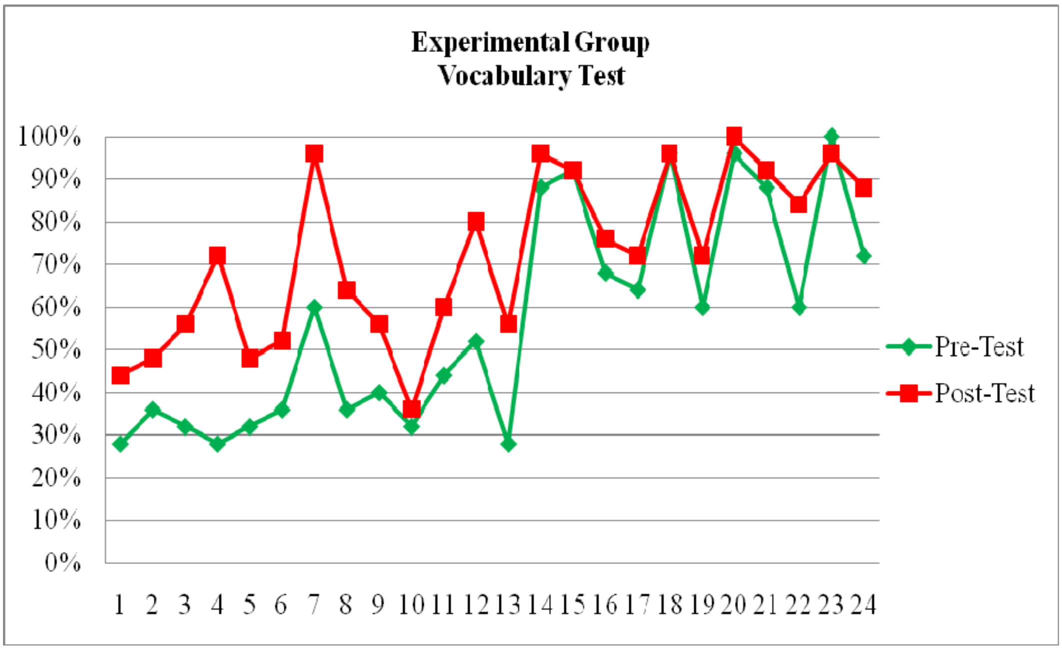

Figure 3 All Scores for Experimental Group

Figures 2 and 3 illustrated a comparison of both Control and Experimental Groups. Figure 2 indicated the outcome of test results in term of pre and post-tests in the study. The results revealed that several students in the control group improved from pre-test, to post-test although the improvement was minimal. Eleven students made 10% or lower improvement. Also only 3 of these students made improvement higher than 10%. In contrast, 3 students such as SC5, SC8, and SC18, showed minor regression in their tests scores during the post-test. These students did not follow the experimental protocol. Their parents consistently picked them up early or these students were frequently absent. These practices that were executed by these three students hindered their vocabulary exposure.

Findings highlighted that traditional teaching strategies such as lectures, handouts and visual aids may have limited effect on improving students' academic vocabulary. Compared with peers in the control group, students in the experimental group demonstrated dramatic improvement in their academic progress. There were 21 out of 24 students who made progress on their post tests. However 13 students made a 10% or higher improvement on their post-test. Only one student (SE 23) did not register a learning gain between pre and post tests.

An analysis of variance between both groups (see Table 4) suggested there is an exponential difference between the control and experimental group performance in the post-test.

Table 4 Results of ANOVA

Variables		Sum of Squares	df	Mean Square	F	Sig.
Pre-Test	Between Groups	54.188	1	54.188	1.374	.247
	Within Groups	1814.292	46	39.441		
	Total	1868.479	47			
Post-Test	Between Groups	234.083	1	234.083	8.032	.007
	Within Groups	1340.583	46	29.143		
	Total	1574.667	47			

Table 4 the overall performance outcome between both groups. The PI employed a simple analysis of variance (also defined as F test) consisting of only one treatment (variable). According to Salkind (2007), the simple analysis of variance also called a one way ANOVA was designed to measure the differences between groups on variables. The PI set the level of risk at .05 to avoid Type I error as a level of significance in terms of the null hypothesis. The F value 8.032 which is larger than the critical value 4.30 indicates that the results are significantly high enough to conclude that the score difference between the two groups is not due to chance or other factors. In other words, the results proved the study was correctly implemented due to the results of both groups in the post-tests results.

Certainly, the results also exhibited that overall there was no pair wise difference between pre and post tests in control and experimental groups. The significance ($p < .05$) only contributed to pre and post tests in experimental group which suggested that cyberreading workstations impacted the vocabulary learning process dramatically in a very limited period of time (in this case 4 months between pre and post tests). In other words, the implementation of cyberreading workstations required for teachers to offer enough time and proper guidance in order for children to benefit from this type of learning instructions.

Interpretations of findings were performed using Onwuegbuzie & Leech (2004) notion of significant statistical, practical and economical significances. The PI set the level of risk at .05 to avoid Type I error as a level of significance in terms of the null hypothesis. In the null hypothesis, the researcher (PI) assumed that there was no difference of the test results of the control and experimental groups. Data analysis, however, suggested the F value 8.032, which is larger than the critical value 4.30 allowed the researcher to reject null hypothesis. Stated differently, results in the post-test indicated that the experimental group had an overall performance of 155% from the pre-test in comparison to the control group participants who increased their post-test scores at 42%. The significant value ($p < .05$ level) also indicates that the results are significantly high enough to conclude that the score difference between the two groups is not due to chance or other factors such as students' socio-economic conditions or parental involvement in the study. The above fact also pointed out that the researcher made correct research hypothesis and decision in rejecting null hypothesis since the F value is more extreme than the critical value. In other words, the results proved the research hypothesis was correct and the research design and strategy, regardless of its limitations (see chapter 3) was well selected.

Certainly, the results also exhibited that overall there was no pair wise difference between pre and post tests in control and experimental groups. The significance ($p < .05$) only contributed to pre and post tests in experimental group which suggested that cyberreading workstations impacted the vocabulary learning process dramatically in a certain time period (in this case 6 months between pre and post tests).

Besides the statistical significance briefly described above, findings from this research might have practical significance since it encompasses with the National Educational Technology Plan — NETP-postulates (US Department of Education, 2010). The plan calls for applying the advanced technologies used in people's daily personal and professional lives to the entire US educational system to improve P-16 students' learning, accelerate and scale up the adoption of effective practices, and use data and information for continuous improvement (US Department of Education, 2010).

Furthermore, the National Education Technology Plan is an invitation to systematically conduct educational technology research that explore how embedded assessment technologies, such as simulations, collaboration environments, virtual worlds, games, and cognitive tutors, can be used to engage and motivate learners while assessing complex skills. In other words, the National Education Technology Plan requests third-order (radical) changes of the entire US educational system instead of evolutionary ones. These cannot be achieved with the adoption of technologies as supplemental resources by school districts.

Adoption of technology as supplemental resources can be considered as an evolutionary approach of promoting educational changes powered by technology. It fosters only first or radical educational changes within the old box (schools district system). To move toward a revolutionary or third order (radical) approach of transforming the American Educational system powered by technology, digital learning, educational video games, virtual learning environments and simulators etc must be used as core medium of instruction aimed at fostering students' learning motivation, engagement and learning retention rates at highest level. Adoption of technology as core medium of instruction has practical impact on teacher education programs. The need for training teacher who will develop professional competences of the digital game-based curriculums designer will be imperative. Therefore, the practical significance of these research findings consists of offering empirical data for further replication studies aimed at transforming the American education system as suggested by NETP (2010).

At last, determining the economic significance means suggesting the cost-effectiveness ratio pertaining to the observed findings. In fact, teaching through cyberreading workstations is highly cost-effective while delivering quality instruction. Luckily, this model is based on the systematic use of technologies that are used in households for home entertainment which are cheaper and affordable for middle-class families. In a field where very little is known findings from this research provide opportunities to access quality education to match today's digital native students' learning styles. This is very important to America's individual and collective growth and prosperity (NETP, 2010).

5. Conclusions

From the above data analysis, the following conclusions were drawn:

(1) Systematic cyberreading workstations had the potential to increase elementary participants' vocabulary. This statement can be justified when observing the exponential growth of the experimental group from the pre to the post-test which reveal a statistically significant difference.

(2) Data analysis suggested that cyberreading workstations were pivotal in increasing the experimental group reading motivation and learning engagement. Thus, they are not only considered as tools that participants were familiar with, but also enhanced participants learning engagement within a stress-free and anxiety-free learning setting.

(3) The ANOVA analysis highlighted statistical significance between pre and post tests in both groups. The results indicated that educators should progressively consider the systematic use of this teaching approach grounded on integration digital technologies that children are familiar with from daily lives in order to achieve significant progress in the learning process.

(4) The overall findings suggested that teaching reading through cyberreading workstations had the potential to effectively narrow the vocabulary gap among Mexican American students. Certainly, implementation of the transformative approach of cyberlearning workstations (use of game-based curriculum at home) might increase parental engagement.

(5) Lastly, this study revealed that, although children are engaged in playing, learning is actually occurring. Results suggested the importance of helping current in-service teachers, understand that today's digital native students learn better when having fun in small groups.

(6) The ultimate result that was clearly revealed by this research project is that cyberreading workstations played a significant contribution in the experimental group scoring higher than the control group that were instructed by using the traditional teaching strategies that most school teachers still execute in today's classrooms. With this in mind, it is imperative that policy makers recognize the benefits of using digital game-based curriculums powered by digital technologies as instructional tools and bestow more financial support for the implementation of similar programs in the educational system.

(7) From data analysis, findings suggested that teaching vocabulary to Elementary Mexican American digital native students through the use of digital-game based curriculum aimed at meeting the digital native students' learning needs be considered as the Pandora's teaching vocabulary strategy. The Pandora's teaching vocabulary strategy can be labeled as a systematic and intensive use of digital technologies widely used for home-based entertainment, digital game-based curriculums and 3D virtual game classrooms as core medium of instruction aimed at enhancing K-12 students' vocabulary skills, reading engagement, motivation and retention rates at the highest level. By nature, this Pandora's teaching vocabulary strategy is based on team learning. The role of Pandora's lead-teacher consists of setting and designing assignments and scaffolding each cyberreading team by applying the well-known as peer-learning and practice by doing instructional strategies. According to the National Laboratory Learning Pyramid (n.d), peer-learning and practice by doing instructional strategies have been accredited as one of the best instructional strategies aimed at increasing students' learning retention's rates (Lalley & Miller, 2007).

(8) The Pandora's teaching vocabulary strategy requests deeper and radical changes on how colleges and schools of education are preparing in-service and pre-service teachers. All teachers should not only be trained on the use of pre-designed digital-game based curriculums, but also to become digital game-based curriculum designer and independent content provider.

6. Future Research

Findings from this exploratory experimental research, which need further validation and replication, provide some empirical data for future studies:

(1) Conduct a replication using a larger population of Mexican American Elementary students in after school programs in more sites to test the generalizability of findings.

(2) Conduct a replication using a larger population of Mexican American Elementary students in a normal classroom/school setting to test the generalizability of findings.

(3) Conduct a replication using a larger population of diverse elementary students in a normal classroom/school setting to test the generalizability of findings.

(4) Conduct a replication using a larger population of diverse middle and high school students in a normal classroom/school setting to test the generalizability of findings.

(5) Conduct a new experimental study using a larger population of Mexican American elementary students and/or diverse students in a normal school setting to explore the systematic impact of cyberlearning workstations in K-12 students in a different content area such as mathematics, sciences and social sciences.

Considering this study limitations (see previous section), all further studies in educational settings should take into consideration some optimal research conditions suggested below:

(1) Reduction of experimental bias at minimal level. To ensure higher internal validity, it is recommended that the treatment provider be 100% blinded. Using educational research terms, the lead-teacher or treatment provider must not be involved in lesson plans design, assessment tools construction, data collection process, and have has limited exposure to the research participants prior to the formal beginning of the educational experimentation stage.

(2) Instead of adopting pre-designed game-based curriculums and 3D virtual games developed by outsiders with limited knowledge of targeted school districts' curriculums and educational vision, the research treatments for both groups should preferably be designed by a multidisciplinary team involving, engineers, engineering faculty experts, school educational administrators and content-area faculty experts. The same principle should be applied for the adoption of tailored standardized assessment tools.

(3) The educational experimentation should be performed in regular classroom settings in order to allow full observation of the treatment protocols and avoid being restricted by potential afterschool program policies.

Adoption of the concurrent triangulation mixed methods research design, especially the QUANT (quantitative)-QUAL (qualitative) strategy involving the true experimental (controlled randomized) technique for QUANT and the grounded theory research procedure, in order to capture all research events that might occur in each research site.

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