LEAPFROG AS AN INTERVENTION FOR ENGLISH LEARNER STUDENTS

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Abstract

of

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Emergent literacy skills are an important beginning step for kindergarten and first grade students in order to read successfully in later grades. An initial literacy deficit often impairs the future success of less prepared students. A student’s first grade reading ability often indicates future reading success. As a way to help improve letter naming and letter sound identification, the effectiveness of a Leapfrog phonics video was evaluated for this thesis. Data was collected from 10 kindergarten and first grade students for a maximum of six weeks. The results indicated that this educational video, which includes specific learning features, improves early reading skills.

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Date
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Chapter 1

INTRODUCTION

Educational television is an underutilized resource in schools. Both teachers’ and parents’ organizations have been skeptical of television’s benefits (Corder-Bolz, 1982). Some recent research still considers the amount of television viewing a valid construct to measure the benefits or determents of television viewing, when “this topic has advanced from studies of total television viewing time to content-specific studies” (Breslin, 2006, p. 109) in order to differentiate between educational and entertainment viewing (Kirkorian, Wartella, & Anderson, 2008). In fact, educational television (EdTv) has been shown to increase literacy skills (Penuel, et al., 2012). In other words, educational television is associated with positive academic gains while entertainment television has a negative impact on education (Kirkorian, Wartella, & Anderson, 2008). Since televisions are found in nearly all American homes (Linebarger, 2001) and audiovisual equipment is present in schools, educational programs should be used as a learning modality.

Many of the educational programs designed for young viewers between the ages of three and six years of age focus on literacy skills. Development of these skills is crucial. However, as Griffith and Olson (1992) explain, the “insight that words are composed of smaller units (i.e., phonemes) may be difficult for some children to grasp because phonemes are very abstract units of language” (p. 516). Since phonemic literacy skills are stable predictors of reading success (Hulme, et al., 2002), they are essential concepts that need to be learned as early as possible in a child’s reading development.
Furthermore, the acquisition of reading skills has positive associations with a child’s future academic outcomes (Cunningham & Stanovich, 1997).

According to Alexander, Entwistle, & Olson (2007), schools are often unable to close gaps in literacy skills found in low and middle socioeconomic status (SES) kindergarteners (as cited in Penuel, et al., 2012, p. 115). However, since positive associations with early literacy skills and educational programming are supported by research, and repeated viewings of EdTV may lead to engagement with the learning content (Kirkorian, Wartella, & Anderson, 2008), EdTV may be an effective teaching tool.

In order to measure the effectiveness of EdTV programs, school-based assessments are used. Researchers, such as Linebarger (2000), often employ Dynamic Indicators of Basic Early Literacy Skills (DIBELS), a program used in elementary schools to monitor student progress in both literacy intervention programs and general education. Because Response to Intervention (RTI), an intervention model, requires progress-monitoring (Fuchs & Fuchs, 2006), EdTV researchers and schools are now using the same diagnostic tools.

DIBELS is used to quantify different aspects of early reading skills such as letter-sound correspondence and letter-naming. According to Foulin (2005), letter-naming is a predictor of emergent reading skills. Furthermore, Castles and Coltheart (2004) conclude that letter-sounds and letter-names “will be at least as good, or better predictor of subsequent reading and spelling achievement than phonemic awareness on its own” (p.
Educational programming, therefore, is targeting these specific skills that lead to successful reading abilities.

Educational television is increasingly designed to fulfill an important role in literacy acquisition. Since many students are unprepared academically and schools are often unable to provide emergent literacy skills, EdTv could become an important intervention. EdTV is becoming an increasingly promising intervention as it employs educationally relevant instructional methods.

**Statement of the Problem**

Emergent literacy skills are an important beginning step for kindergarten and first grade students in order to read successfully in later grades. A disproportionate amount of students lacking basic literacy skills come from lower income families (Hart & Risley, 1995). This initial literacy deficit often impairs the future success of less prepared students since a student’s reading ability by the end of first grade often indicates a student’s future reading ability (Spira, Bracken, & Fischel, 2005). Moreover, according to the Annie E. Casey Foundation, 85% of low-income students attending high-poverty schools are unable to read proficiently by the end of the third grade (2010). Students who are unable to develop basic reading skills by the end of third grade are six times more likely to drop out of school than proficient readers (Hernandez, 2011). Schools often lack the capacity to deliver effective interventions for students without basic phonemic skills. Low SES students often do not have the benefit of an effective education tailored to meet the unique obstacles they face (Miller, Heafner, & Massey, 2009). Effective, efficient
interventions are needed to address the deleterious effects of low SES on reading acquisition.

**Significance of the Study**

Emergent literacy skills are an essential cornerstone of students’ future academic outcomes. Without basic literacy skills, educational development stagnates and future academic growth is jeopardized. This link between emergent literacy skills and later learning is important since education is a defining feature of societal success and economic wellbeing. Low SES students are chronically deprived of an education that allows for upward mobility (American Psychological Association, 2013).

Since schools are held accountable for student learning, effective emergent literacy interventions need to be developed and implemented. However, many underperforming schools have students lacking the basic literacy skills defined by the California Standards, yet these students are still promoted to the next grade level. This means that empirical evidence needs to be gathered on potential interventions that will quickly and efficiently build basic literacy skills to equalize these students’ abilities with the requirements of their grade level.

**Need for the Study**

Students without emergent literacy skills have low levels of academic success. Students leaving first grade with poor reading skills have an extremely high probability of being poor readers at the end of fourth grade (Juel, 1988). A focus on early literacy skills is vital since these skills predict future academic outcomes. Students from low SES
homes often have poorer academic outcomes (Aikens & Barbarin, 2008). This is a matter of great concern, considering over half of California’s school-age students are eligible for free or reduced lunches (National Center for Education Statistics, n.d.)

Another barrier to academic success is English proficiency. English Language Learner (ELL) students often have difficulty learning to read in the early grades (Haagar & Windmueller, 2001). Just over 20% of school-aged children speak another language at home, and, of those, 5% speak English with difficulty (National Center for Education Statistics, n.d.). Linan-Thompson (2006) concluded that Spanish speaking EL students receiving reading interventions in English during first grade would likely benefit from earlier interventions when compared to Spanish interventions. However, students with a home language other than English are less likely to receive early intervention services, and, if from lower-SES homes will have a greater probability of numeracy and receptive language delays (Morgan, Farkas, Hillemeier, & Maczuga, 2012).

What is common to all of these difficult situations is the need to teach basic literacy skills to children as young as possible. California’s budget difficulties (Legislative Analyst’s Office, 2012 ), diverse ethnic composition (Legislative Analyst’s Office), larger class sizes and lower per pupil spending (Legislative Analyst’s Office) are not likely to change for the foreseeable future. Therefore, finding alternative ways to efficiently grow and encourage student skills is a necessity.
Purpose

The purpose of this quasi-experiment was to test the effectiveness of an educational video to effectively teach phonics to struggling students. Students viewed the Leapfrog “Letter Factory” video to see if the video facilitated the skills of letter-naming and letter-sound correspondence. The independent variable was the amount of exposure the student had to the video. The dependent variables were defined as positive improvement in letter and sound naming on the CBM-LS and CBM-LN. As a quasi-experiment, the control group was a comparison with other student results on AIMSWeb CBM national norms and API scores. Specifically, this study was designed to address the following research questions:

1. Is there a significant difference in students’ letter-identification skills after being exposed to the video?
2. Is there a significant difference in students’ letter-sound correspondence skills after exposure to the video?

In this study, the video’s results were progress monitored. The following are the focused hypotheses of this project:

1. The students chosen for this study will see an increase of two letters per week in their letter-identification skills.
2. The students chosen for this study will see an increase of two letter sounds per week in their letter-sound correspondence skills.
Limitations

There is strong empirical evidence supporting the integration of educational television into the classroom. The video chosen for this project has the essential characteristics of a strong narrative with an educational content using many research-based instructional techniques embedded in the program.

As a quasi-experiment, results are interpretive. In the school setting, the experiment will not be able to control the environment and therefore confounding variables will inevitably interfere to some extent.

Academic gains due to educational programming are usually strongest in the preschool years.

Defined variables such as ethnicity, SES, and language may be factors without experimental controls. Although the effects are important to understand, this limited application of the video will be insensitive to the specific magnitude of the above stated factors.

An additional limitation will be the measurement of specific confounding variables. Each variable will not be weighted or accounted for on an individual level. Factors such as teaching style, class size, CALPS, family ethnicity, or English proficiency is not the focus of this experiment.

A very crucial limitation of this study is measuring the degree to which the video is properly implemented in participating schools. Available supervision, staff motivation, and an environment without distractions are all possible confounding variables.
Since this will be a regional study using a school located in a suburban area of Northern California, near Sacramento, generalization of results to other regions and states may be difficult.

**Definitions**

**CBM:** Curriculum-based measure is a norm-based tool for measuring an aspect of literacy.

**CBM-LNF:** Curriculum-based measure for collecting data on the number of letters a student is able to recognize.

**CBM-LSF:** Curriculum-based measure for collecting data on a student’s ability to match a letter to its sound.

**EdTV:** Educational television is a specific format of television that is designed using empirical evidence to create programs that merge an interesting narrative with educational content to maximize learning for children between ages 3 to 6 years old. Other programming exists, but these defined criteria are the scope of this review.

**SES:** socioeconomic status.

**Success:** success will be indicated by positive effect sizes over 0.70.
Chapter 2

LITERATURE REVIEW

Educational television (EdTV) aids children in acquiring reading skills (Linebarger, Kosanic, Greenwood, & Doku, 2004; Linebarger, 2004). Between the ages of three and five, exposure to EdTV is associated with positive effects for children (Zimmerman & Christakis, 2005). Current educational programming for emergent reading skills usually targets children between the ages of three to six years old. Developmentally, this appears to be the time when children develop the “ability to accurately perceive and interpret televised presentations [and this] appears to be a function of experience and cognitive development” (Corder-Bolz, 1982, p. 92). One definition of educational television states that programs should be “produced with the intent of serving specific educational objectives” and “should be evaluated through empirical research with children” (Fisch, 2004, p.8). Over thirty years of research indicates that introducing educational television to children over three years old may facilitate learning and predict positive future academic outcomes (Fisch & Truglio, 2001).

Models of Educational Television

Sesame Street

Sesame Street is the most studied educational program model (Fisch & Truglio, 2001a). This program’s longevity and positive effects on learning (Fisch & Truglio, 2001a) occur because of an emphasis on research, content and production. Fisch and Truglio (2001b),
have synthesized the categories of Sesame Street’s model that create a strong educational message. Sesame Street has seven essential characteristics: a detailed curriculum; appeal to children; concrete and explicit examples of content; child-centered content; repetition and reinforcement; positive modeling; and providing opportunities for viewer participation.

Longitudinal studies of Sesame Street associate the interaction of educational television exposure and academic outcomes. According to Anderson & Hanson (2009), watching Sesame street as a child was a predictor of increased “leisure-time book reading during high school” (p. 1207) and better academic performance in high school. Based on these research-based findings, other educational programs are incorporating methods found in Sesame Street.

**Recent Models.**

More recent educational programs such as *Between the Lions* and *Super Why!* focus on developing children’s emergent literacy skills such as alphabet knowledge, phonological awareness, and phonemic awareness (Linebarger, 2000; Linebarger, McMenamin, & Wainwright, n.d.). In fact, viewers of *Between the Lions* increased rates of word recognition and standardized reading test scores compared to nonviewers (Linebarger, 2000; Linebarger, Kosanic, Greenwood, & Doku, 2004;). Panuel et al. (2012) also found that supplementing a preschool curriculum with clips of well-designed EdTV programs had a positive effect on children’s literacy skill development. When children between the ages of three and six are exposed to educational television using
research-based learning strategies there are generally positive associations with academic outcomes.

**Benefits of Educational Television**

Due to accumulating evidence about cognitive benefits, EdTV is gaining traction with education professionals. Other electronic media, such as computers, are already widely accepted and blended learning is an emerging paradigm in education (Heinze and Procter, 2010). However, television viewing, including educational television, is often viewed negatively by teachers and parents (Corder-Bolz, 1982). The difference in the perceived value of different forms of electronic learning may be based partly on generalizations from earlier research of EdTV, rather than the latest research-supported circumstances in which television may actually improve learning. After thirty years of research, and positive momentum, EdTV may yet become an important cognitive intervention in school for students lacking emergent literacy skills.

The U.S. Department of Education identified EdTV as an important vehicle for delivering emergent literacy skills. The Public Broadcasting System (PBS) and the Corporation for Public Broadcasting (CPB) have both received grants to design television dedicated to designing learning programs based on empirically supported constructs for educational television. These programming efforts target preschool age children. The need to improve educational media is an important step in distributing educational content (Calvert & Kotler, 2003; Fisch, 2007) and has been legislated by the Children’s Television Act. The grants are based on findings that children may begin learning from EdTV at about the age of three (Anderson & Pempek, 2005; Linebarger, 2000;
Zimmerman, Christakis, & Meltzoff, 2007) and that beneficial differences in emergent literacy skills may be seen in children who view EdTV compared to those children viewing entertainment television (Anderson, 2008; Kirkorian, Wartella, & Schmidt & Vandewater, 2008; Vessey, Yim-Chiplis, & MacKenzie, 1998; Wright et al., 2001).

In longitudinal studies, the EdTV viewing habits of five-year-olds were found to be positively associated with high school grades and predictive of reading habits in adolescence (Anderson, Huston, Schmitt, Linebarger, & Wright, 2001). Higher grades in high school math, science, and English were positively associated with exposure to EdTV in childhood. Generally, students who engaged with EdTV instead of entertainment television saw positive academic outcomes.

Educational television is often categorized with entertainment television. This negative perception of EdTV as a possible learning tool may be traced partly to early studies of television’s impact on children conducted in the 1970’s (Kirkorian, Wartella, & Anderson, 2008). Although any television for children under age three is associated with language delays (Zimmerman, Christakis, & Meltzof, 2007), there are positive associations for educational viewing by older children.

The first studies to use electroencephalographic (EEG) equipment to study brain activity while watching television concluded that any television viewing decreased brain activity. However, the studies were inaccurate due to the poor sensitivity of the equipment to detect brain activity properly (Anderson, 2007). The result was that the data was inaccurate and misinterpreted. Anderson declares that these “early studies were poorly designed and executed, allowing little to be certainly concluded (p.77).
Many other researchers have continued to share their skepticism of television’s value, although these studies lack differentiation between hours spent with EdTV and those with entertainment television. For example, Roberts (1984) found television to be a predictor of lower reading achievement, comparing the hours different groups of children spent watching television with reading, but failed to isolate the ratio of educational and entertainment television. The distinction between educational and entertainment television has important implications. Anderson & Hanson (2009) regard the content and type of media as more important than the amount of viewing time. This is an important element since studies indicate that viewing “educational TV is linked positively with academic achievement; [while] viewing entertainment TV is linked negatively with achievement” (Schmidt & Vandewater, p. 63, 2008).

In the future, brain scanning fMRI technology will allow for a more precise measurement of the relationship between television and learning (Anderson & Hanson, 2009). It is now known that the brain is active while watching any form of television. Violent television has been shown to activate many parts of the brain’s right hemisphere, including regions responsible for attention and memory encoding and retrieval (Murray et al., 2006). Other fMRI results indicate that seventeen separate areas of the brain in the right hemisphere are active while processing any form of video (Anderson, Fite, Petrovich, & Hirsch, 2006). Although this research was performed with adults, it suggests important implications for creating educational programming that effectively assists in children’s learning.
Since the left hemisphere is responsible for language encoding, this research suggests that television is not linguistically encoded (Anderson & Hanson, 2009). Since the mind is active during any television or media encounter, the structure of the EdTV programming is vital to delivering learning opportunities.

In fact, it is the negative activation of children’s brains that is often cited as a reason to limit or avoid entertainment television. One study by Lillard and Peterson (2011), found that nine minutes of entertainment television was capable of impairing a four-year-old’s executive functioning. Citing previous studies, Lillard and Peterson posit that entertainment television may overwhelm young children’s ability to rapidly encode fast-moving visual information (Buschman & Miller, 2007), and is associated with attentional impairment (Zimmerman & Christakis, 2007). Furthermore, significant exposure to high-interest, non-educational television could likely interfere with language acquisition and brain development (Zimmerman, Christakis, & Meltzoff, 2007).

The structural features of EdTV are different from entertainment television. To maintain educational integrity, programs must have several key components for positive academic outcomes. Educational television should stimulate interest in viewers to interact and absorb the content. To learn, a student must be motivated to interact with a subject to construct knowledge (Kuhn, 2007) and this principle applies to EdTV as well (Linebarger & Piotrowski, 2010a). However, Gabrelian, Blumberg, and Hogan (2009) determined that “children do not necessarily have to like what they see on an educational television program to feel confident they understand what they saw (p. 167).” But Valkenburg and Cantor (2000), also report that children choose entertainment programs
that they understand and enjoy (as cited in Gabrelian, Blumberg, & Hogan, 2009, p. 162). Therefore, as Calvert explained, since entertainment facilitates attention, it is beneficial to delivering EdTV’s educational message (as cited in Gabrelian, Blumberg, & Hogan, 2009, p. 162). Corroborating entertainment’s importance, Zillman, Williams, Bryant, Boynton, & Wolf (1980) found that humor is effective in maintaining attention and has resulted in the acquisition of educational information for preschoolers and first graders (as cited in Gabrelian, Blumberg, & Hogan, 2009, p. 162).

Overall, children have complex interactions with educational programming. EdTV is able to illicit children’s attention by embedding academic content inside an interesting narrative. The learning potential of EdTV increases when the learning content drives the story’s narrative in which the characters participate, rather than having learning material sporadically interspersed (Fisch, 2000).

To appeal to children, programs need to be understandable and accessible (Linebarger, 2004). Between the ages of three and seven, children will choose programs that are more cognitively difficult and “integrate and interpret content according to the intellectual skills and schemata that they possess” (Murray & Wartella, 2007, p. 48). Specifically, Huston and Wright identified that educational information needs to be “moderately novel, of intermediate complexity, integratable, somewhat regular, partially ordered, and recognizable” (as cited in Linebarger et al., 2004, p. 298) to generate the most interest and attention for learning. This model is reminiscent of Vygotsky’s zone of proximal development where a student is exposed to material that is built on prior knowledge and then guided to understanding through modeling and practice. The
program content that a viewer chooses is vital to positive academic outcomes (Schmidt & Vandewater, 2008), more so than the time spent viewing (Anderson & Hanson, 2009), and “has a lasting cumulative impact” (Bickman, Wright, & Huston, 2001, p. 102).

The narrative formats of EdTV contribute to literacy skill development (Linebarger & Piotrowski, 2009). EdTV uses many of the same literary strategies found in classroom instruction (Panuel et al., 2012). These strategies are most effective when embedded in the narrative, although expository learning in television may be effective with guidance (Linebarger & Piotrowski, 2010). However, successful mastery of narrative comprehension across different media, including television, by age six, has been found to predict reading comprehension abilities at age eight (Kendeou, van den Broek, White, & Lynch, 2007). Furthermore, learning strategies learned in one form of media transfer to other media (Kendeou et al., 2007; Linebarger & Piotrowski, 2010) and may benefit both academic achievement and cognitive development (Bickman, Wright, & Huston, 2001).

According to Linebarger and Piotrowski (2010), educational television must provide opportunities for viewers to practice reading in order to be beneficial. This may be accomplished with visual content (i.e., letters) that grows or contracts onscreen, and audio intonation cues to signal important skills. The combination of both seeing and hearing together has advantages for learning (Schmidt & Vandewater, 2008). Prompts by television characters for viewers to monitor and practice literacy skills and comprehension are also important (Penuel et al., 2012). These embedded techniques lead to greater integration of visual and auditory cues. This combining allows viewers to more
readily acquire the initial abstract concepts prominent in literacy skills by connecting the abstract with concrete mental images (Sadoski, 2009).

Rice and Woodsmall (1988) found, and Wright et al. (2001) confirmed, that viewing EdTV allows children to transfer specific word knowledge from TV to more general schematic rules (as cited in Linebarger & Piotrowski, 2010, pg. 1583). Patterson (2002) concluded that these results were unique to educational television (as cited in Linebarger & Piotrowski, 2010, pg. 1583). Educational television’s format contributes to literacy skills development by maintaining the viewer’s attention through interesting images and audio descriptions. EdTV also uses several teaching practices to increase viewer comprehension and learning. Viewers are able to construct meaning from educational programming because it incorporates the activation of prior knowledge, introduces information incrementally, allows for the repetition of content in various forms, and invites the viewer to make predictions (Linebarger & Piotrowski, 2010).

Educational programming also develops positive messages about reading. Through the narrative structure of EdTV, the characters interact positively with reading material in the form of letters and words, (Penuel et al., 2012) making literacy skills more readily accessible (Linebarger & Piotrowski, 2010). This positive interaction with letters and words by the characters reinforces the value of reading for viewers. Replaying episodes or segments increases both the frequency and opportunity to engage with learning content (Kirkorian, Wartella, & Anderson, 2008). EdTV allows viewers to continue to have positive reading messages reinforced while learning or practicing reading skills.
Theories Regarding Learning Potential of Television

Multiple theories have been developed to explain the learning potential of television programming. However, only three of the most supported theories will be introduced. These theories have consistently been found to explain the relationship between educational television and academic outcomes. The following models explore the connection between narrative and understanding. Although educational television may be expository, narrative formats are predominant. A narrative strengthens an educational program because it makes the learning content relatable to children.

Social Cognitive Theory

Social Cognitive Theory is often used to explain how television facilitates learning. Children learn easily from both observation and interesting characters on television when programming involves skills that student-viewers want to emulate (Bandura, 2001). Furthermore, children need to see aspects of themselves in an educational program. Smith (2002) outlined traits of Bandura’s model that have been successful in educational programming in different countries. To be successful, an educational program needs to incorporate broad or specific societal traits that are recognizable to the viewer. Additionally, characters have to be developed from one of three templates: characters whose behavior elicits positive results; a negative character whose actions have adverse consequences; or a transitional character who sees the value of changing his or her behavior. These constructs are visible in most successful EdTV programs and allow viewers to absorb the educational content more easily, especially if the narrative and introduced skill are integrated.
Capacity Model

The Capacity Model posits that an educational program needs to combine its narrative and educational content as much as possible to decrease the strain on working memory (Fisch, 2004). Working memory may be impacted by the amount of visual and auditory stimuli the viewer needs to process. This model has two other important constructs: the processing of narrative, and the processing of educational content. Any distance between the narrative and content decreases the educational effectiveness of the program. In other words, a program whose educational message is unrelated to the story will have a high cognitive load since the viewer has to expend more processing energy making the necessary connections between the narrative and content. Moreover, children must learn to interpret the formal features (i.e., camera zoom) of television that “maintain attention, mark important content, and transmit meaning” (Van Evra, 2004, p. 38).

Traveling Lens Model

The Traveling Lens Model purports that there are many different levels at which television programming can be mentally processed. (Rice, Huston, & Wright, 1982). Since children often make their own viewing choices (Bickman, Wright, & Huston, 2001), attention is an important educational concern. Traveling Lens Model proponents believe that children’s attention will be low if the viewer finds programming boring or incomprehensible. Boredom will result if a program relays concepts that are too familiar, simple, redundant, or predictable.
On the other end of the spectrum, if programs are incomprehensible, this will also lead to a viewer losing interest (Linebarger, et al., 2004). Viewer incomprehensibility is the result of a program that introduces concepts that are too novel or complex. A child needs schema and the use of previous knowledge in order to learn new information. Programs that are inconsistent or too unpredictable also diminish viewer attention rapidly.

According to Rice, Huston, and Wright (1982), successful programming needs to present information that is moderately novel and of intermediate complexity. This will maintain attention and facilitate learning by activating prior knowledge. This supports the observation that five-year-olds gain greater benefit from novel vocabulary introduced by EdTV and suggests that childrens’ accumulated language knowledge may contribute to this phenomenon (Rice & Woodsmall, 1988). Therefore, new information will be recognizable, encoded and stored.

**Other Learning Theories**

Dual Coding Theory, developed initially by Allan Paivio while researching bilingual processing (Ryu, Lai, Colaric, Cowley and Aldag, 2000) has been described as “one of the most influential theories of cognition this century” (Marks, 1997, p. 432). While this theory was not developed to explain the learning potential of EdTV, its premises may help explain the cognitive underpinnings that facilitate memory and learning when language and images are combined educationally. This theory purports that memory is affected by both verbal and nonverbal (imagery) representations, which supplement each other in encoding memories (Ryu, Lai, Colaric, Cowley and Aldag,
2000). Thus, this theory effectively connects imagery and verbal input in the formation of memory and learning (Sadoski and Paivio 2007). The verbal coding system deals with the different forms of language, while the nonverbal imagery code renders "nonlinguistic objects and events in the form of mental images" (Sadoski, 2009, para. 3). Sadoski (2009) reports that verbally encoded information, which strongly relates to mental imagery, is easier to remember than more abstract concepts. Thus the concept "steaming coffee" is easier to remember than the concept "truth." Therefore, the combining of the verbal code in the form of letters, sounds and words with mental imagery in the form of EdTV should facilitate better memory and learning in viewers.

**Summary**

Educational television has many beneficial effects for teaching children basic literacy skills. Television as a medium is very interesting to children. When educational television programs are designed with appropriate educational goals using narrative and scaffolded content, the results are increased learning for children. Higher emergent literacy scores are found among viewers than non-viewers of some educational programs. When programs are designed with educational content embedded as part of the narrative, EdTV is very efficient at transferring educational knowledge. Educational programming works well when it uses educational techniques to prompt children to encode and store information with prompts and opportunities to practice. In general, responsible exposure to educational programming has beneficial effects for children’s emergent literacy skills and predicts positive future academic outcomes.
Chapter 3

METHODS

Participants

Participants in the study were English Learner students demonstrating difficulty learning English phonetics. Participants finishing the study included 5 kindergarten and 5 grade 1 students attending public schools in three different districts in Northern California. The students’ primary languages were Serbian, Russian or Spanish. Students were enrolled at a Title 1 elementary school in Rocklin, California, a charter elementary school in Auburn, California and a Title 1 elementary school in Carmichael, California. Group 1 had three kindergarten students, Group 2 had two kindergarten students and two first grade students, while Group 3 had three first grade students.

Design

A quasi-experimental design was used for this study due to the inability or ethics of controlling the participant’s educational environment. The students were within the same age range and ability.

The dependent measures included the students’ scores on CBM-LNF and CBM-NSF. The independent variable was the number of Leapfrog video viewings.
**Instruments**

**Curriculum based measure**

CBM’s from AIMSWeb were used for this study. A different CBM was used for each student each week. The CBM were the CBM-LNF and CBM-LSF for Kinder and Grade 1.

**Leapfrog Video**

The video is a thirty-five minute, animated cartoon in which characters explore the names and sounds of the English alphabet. The video uses many elements found to generate learning in educational programming. The learning content (alphabet sounds) is a key aspect of the story’s narrative. The main character is a little boy named “Tad” who young viewers will identify with because he wants to learn his letters and sounds. The video also introduces the alphabet incrementally, then repeats exposure to the letters for review and as a check for understanding. Specifically, after a set of five to six letters, the letter names and sounds are reviewed using song and humor. At the end of the video, all of the letter names and sounds are reviewed with a song. The letters talk and each one has a unique mnemonic device to assist the viewer in remembering the letter sound.

**Procedures**

This experiment was conducted at three elementary school sites in Rocklin, California, Auburn, California and Carmichael, California. Students were identified by teacher recommendation of EL learners struggling with letter names and sounds. Parents of prospective students were contacted by phone or in person and translators were
employed when needed. A consent letter was given to the accepting parents (Appendix A or B).

This experiment avoided any conflict of interest by the researchers, as CBM’s are nationally normed and therefore lack bias since the students involved were represented in the norming sample. CBM’s are nationally normed tests which are both valid and reliable.

Before the first viewing, a baseline for each participant was established. CBM’s for letter-naming and letter-sound correspondence were administered to each individual student. After each student’s pre-intervention abilities were established, the educational video was introduced.

The students were shown the Leapfrog video once a week and then CBM’s were administered to each student individually. Group 1 had four intervention sessions. Group 2 and Group 3 had six intervention sessions. The video was first shown in a small group setting and then the CBMs (Appendices C & D) were administered individually after each viewing. These results were secured by an experimenter.

**Data Collection**

Each student was assigned a letter to keep data private. Each session’s data was collected and secured by a researcher. Each CBM charted student response to the video as an intervention.
Data Analysis

The data sets were the types of CBM mastery: Letter-name Fluency and Letter-Sound Fluency. For each type of CBM mastery, the data was collected and plotted on a clustered graph. Each type of CBM had its own graph. The $y$-axis measures sessions the student participated in from 1 to 14. The $x$-axis has from 0 to 24 to track letter name and letter-sound fluency.
Chapter 4

RESULTS

This pilot study was to evaluate the effects of a Leapfrog learning video on English Learner’s ability to correctly identify both letter names and letter sounds. Initially, 10 kindergarten and grade 1 students participated in three different school districts. The students were all identified as EL students who spoke Spanish, Russian and Serbian. Due to scheduling, one group of students received the intervention for four weeks (students 1-3) while the others received the intervention for six weeks. The weekly intervention was to watch the Leap Frog video and then measure the effects with Curriculum Based Measures (CBM’s) for letter names and letter sounds. The CBM Letter Name probe measures speed and accuracy of letter name identification. The CBM Letter Sound probe measures speed and accuracy of letter sound identification.

The CBM data was collected by the authors. After viewing the video, each student was individually tested and the results were recorded in accordance with CBM procedures. To assess the effectiveness of the intervention, the mean, effect size and standard deviation were calculated using the preprogrammed statistical algorithms on the website Intervention Central, Chart Dog.org (Intervention Central, 2012).

Four Week Intervention

This group of three students received four weeks of intervention. It is important to note that a week-long school vacation took place between Week 2 and Week 3 of the intervention process. Week 3 took place in a small office with distracting stimuli and a disrupted regular routine (rainy day schedule). Week 4 similarly took place in a novel
location, with an observer the students were unfamiliar with and were distracted by her presence throughout the video and progress monitoring.

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>CBM LETTER NAME</th>
<th>CBM LETTER SOUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>10.50</td>
<td>5.75</td>
</tr>
<tr>
<td>Student 2</td>
<td>8.50</td>
<td>0.75</td>
</tr>
<tr>
<td>Student 3</td>
<td>0.00</td>
<td>10.00</td>
</tr>
<tr>
<td><strong>Average Effect Size</strong></td>
<td><strong>6.33</strong></td>
<td><strong>5.50</strong></td>
</tr>
</tbody>
</table>

Students had varying degrees of performance consistency and growth in both letter naming and letter sound identification. Students 1 and 2 showed positive effect sizes for both letter naming and letter sounds, while Student 3 had a null effect size for Letter Naming, but a significant improvement in letter sound recognition. Despite less than ideal circumstances for viewing video and progress monitoring, all students showed a positive effect size in at least one measure. The overall average effect sizes were 6.33 for letter naming and 5.50 for letter sound identification. Effect sizes over 0.8 are considered large and the students combined average scores indicate significant improvement.
Student 1

Letter Names

<table>
<thead>
<tr>
<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>13.0</td>
<td>1.00</td>
<td>10.5</td>
</tr>
<tr>
<td>Intervention</td>
<td>26.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Letter Sounds

<table>
<thead>
<tr>
<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>8.00</td>
<td>1.00</td>
<td>5.75</td>
</tr>
<tr>
<td>Intervention</td>
<td>13.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Student 2**

**Letter Names**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>15.0</td>
<td>1.00</td>
<td>8.50</td>
</tr>
<tr>
<td>Intervention</td>
<td>23.50</td>
<td>1.00</td>
<td></td>
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**Letter Sounds**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
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<tr>
<td>Intervention</td>
<td>1.75</td>
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**Student 3**

**Letter Names**

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<th>Effect Size</th>
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<tr>
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<td>26.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Intervention</td>
<td>26.00</td>
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<td></td>
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**Letter Sounds**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
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<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>31.00</td>
<td></td>
<td>10.00</td>
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</table>
Six Week Intervention

For the six week video intervention, there were seven EL students at two separate school sites. Each school was located within a different district. For both of these groups, the intervention routine and location were consistent.

<table>
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<tr>
<th>GROUP 2</th>
<th>EFFECT SIZE RESULTS</th>
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<tbody>
<tr>
<td>STUDENT</td>
<td>CBM LETTER NAME</td>
</tr>
<tr>
<td>Student 4</td>
<td>3.07</td>
</tr>
<tr>
<td>Student 5</td>
<td>5.77</td>
</tr>
<tr>
<td>Student 6</td>
<td>1.67</td>
</tr>
<tr>
<td>Student 7</td>
<td>2.77</td>
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<tr>
<td>Average Effect Size</td>
<td>3.32</td>
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<table>
<thead>
<tr>
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<tbody>
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<td>STUDENT</td>
<td>CBM LETTER NAME</td>
</tr>
<tr>
<td>Student 8</td>
<td>-0.29</td>
</tr>
<tr>
<td>Student 9</td>
<td>1.30</td>
</tr>
<tr>
<td>Student 10</td>
<td>3.77</td>
</tr>
<tr>
<td>Average Effect Size</td>
<td>1.59</td>
</tr>
<tr>
<td>6 Week Average Effect Size</td>
<td>2.58</td>
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</table>

As with the four week intervention group, the students in the six week intervention groups had variation in performance consistency and growth in letter naming and letter sound identification. In Group 3, the examiner noted signs of inattention for Student 8 and Student 9 as noted by consistent off-task behavior. Specifically, these behaviors included consistent fidgeting with hands, feet, and objects in the room; beginning conversations with others; and asking for repeated breaks. Regardless, with the exception of Student 8’s Letter Naming score, all student results indicate significant improvement. Effect sizes over 0.8 suggest large improvement. The average effect size for letter naming was 2.58 and the average effect size for letter sound identification was 4.16. These results indicate significant overall growth.
Student 4

Letter Names

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<th>Phase</th>
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<tr>
<td>Intervention</td>
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<td>12.12</td>
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Letter Sounds

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<th>Standard Deviation</th>
<th>Effect Size</th>
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</thead>
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<td>1.01</td>
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<tr>
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<td>1.01</td>
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Student 5

Letter names

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<tr>
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Letter Sounds

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</thead>
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<td>Baseline</td>
<td>3.67</td>
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<td>3.25</td>
</tr>
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Student 6

Letter Names

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Letter Sounds

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<th>Standard Deviation</th>
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</thead>
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Student 7

Letter Names

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</thead>
<tbody>
<tr>
<td>Baseline</td>
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<td>2.77</td>
</tr>
<tr>
<td>Intervention</td>
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</table>

Letter Sounds

<table>
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<tr>
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</thead>
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<tr>
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**Student 8**

Letter Names

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<th>Phase</th>
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<tr>
<td>Baseline</td>
<td>51.33</td>
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<td>-0.29</td>
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<td>Intervention</td>
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Letter Sounds

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<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
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</tr>
<tr>
<td>Intervention</td>
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**Student 9**

Letter Names

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<th>Effect Size</th>
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<td>38.67</td>
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<td>1.30</td>
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<td>Intervention</td>
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Letter Sounds

<table>
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<tr>
<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>18.67</td>
<td>7.57</td>
<td>2.93</td>
</tr>
<tr>
<td>Intervention</td>
<td>40.83</td>
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</tbody>
</table>
Student 10

Letter Names

<table>
<thead>
<tr>
<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>56.00</td>
<td>2.65</td>
<td>3.77</td>
</tr>
<tr>
<td>Intervention</td>
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<td></td>
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Letter Sounds

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<th>Phase</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Effect Size</th>
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<tbody>
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<td>42.67</td>
<td>4.16</td>
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<tr>
<td>Intervention</td>
<td>69.50</td>
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Chapter 5

CONCLUSIONS

When looking at the effect sizes for all students participating in this intervention, it is clear that, in almost all cases, a weekly exposure to the educational video increased student competence in letter naming and letter sound identification. Two students, Student 3 and Student 6, did not show growth in their letter naming capabilities. While Student 3 demonstrated an effect size of 0.00 for Letter Names; an effect size of 10.00 was shown in Letter Sounds. Student 6 demonstrated an effect size of -0.29 for Letter Names, however had an effect size of 1.95 for Letter Sounds.

When the average effect sizes were calculated for both the Four Week Intervention group (Group 1) and the Six Week Intervention group (Group 2 and Group 3), positive, significant effect sizes were found. The Four Week Intervention group had an average Letter Names effect size of 6.33 and an average Letter Sound effect size of 5.50. The Six Week Intervention group had an average Letter Names effect size of 2.58 and an average Letter Sound effect size of 4.16. Each of these statistics is categorized as being a large effect size.

Limitations

There were some limitations and confounding factors in this pilot study involving both Group 1 and Group 3. Initially Group 1 was planned to be a six week long intervention; however, due to scheduling issues, the intervention had to be shortened to four weeks. Additionally, a week long school holiday intervened between Weeks 2 and 3. The students received the Week 3 intervention and were progress monitored on their
first day back to school. This first day back was also a rainy day schedule and students had not been permitted on the playground during recess due to the damp conditions. The examiner noted that the students had a greater level of physical activity and distractibility during this session than they had previously displayed. These factors may have contributed to lowered performance during Week 3.

More difficulties with Group 1 included having to change locations for both Weeks 3 and 4. The Week 3 intervention and progress monitoring took place in a new setting which was a small office with many distracting stimuli such as puppets, toys and games. The examiner noted that the students were often distracted by objects in the room and needed frequent redirection. During progress monitoring, the students were close enough to each other that the student engaged in progress monitoring was often distracted by her peers and needed frequent redirection to stay on task. Limited focal maintenance may have further adversely affected students' performance during Week 3.

The Week 4 intervention and progress monitoring took place in another new environment. An observer entered the room after the video began playing and so was not able to familiarize herself with the students. The students frequently looked at the observer and often needed redirection during the playing of the video. During progress monitoring the students were similarly distracted by the visitor. One student turned and tried to start a conversation with her during timed progress monitoring, while another student tried to ask the examiner about the visitor during progress monitoring. All three students turned to look at the visitor during progress monitoring. This lapse in attention may have negatively impacted their Week 4 performances.
There were further difficulties with students in Group 3. Two students were very physically active during the intervention, at times dancing or running in place or manipulating objects in the environment such as parts of furniture. Additionally, they often looked around the room and had to be frequently redirected. It is likely that this lack of focal maintenance adversely affected their performances throughout the intervention.
Appendix A

Informed Consent Letter/Permission Slip: English Version

Parent/Guardian Consent Form for Early Literacy Training

Dear Parents/Guardians,

With your permission, NAMEHERE Elementary School would like to invite your student to participate in an early literacy training program with a graduate intern in School Psychology. There will be one session a week for a maximum of six weeks. Each session will last for thirty-five minutes, during after school care or as an additional classroom activity during the day. It is hoped that this program will help students to learn their letter sounds. Learning letter sounds is the first step towards reading well.

Your child’s participation is completely voluntary and confidential. During these sessions, your child will view a phonics-training video from Leap Frog Inc. In order to determine the effectiveness of this program, your student will be assessed both before and after their participation for their ability with letter sounds. All results from these assessments will remain confidential.

If you would like more information or have any questions, we can be contacted at the following telephone numbers: (916) 616-9605 and (707) 972-1569.

Thank you,

SUPERVISOR NAME
School Psychologist

Lisa Yocum
Graduate Student

Quinn Ballard
Graduate Student

☐ I give permission for my student, _____________ to participate in individual counseling sessions.

☐ I do not give permission for my student, _____________ to participate in individual counseling sessions.

Parent/Guardian Name (Please Print)

Parent/Guardian Signature Date

Student Name (Please Print)
Appendix B

Informed Consent Letter/Permission Slip: Spanish Version

Padres/Guardian Forma de Consentimiento de Entrenamiento de Literatura Temprana

Queridos Padres/Guardianes,

Con su permiso, la Escuela Primaria SCHOOLNAME le gustaría invitar a usted y su estudiante a participar en un programa de entrenamiento de literatura temprana con un practicante de Psicología en Educación. Tendremos una sesión por semana con un máximo de doce semanas. Cada sesión durará treinta y cinco minutos, durante el cuidado de después de escuela o en cuanto tengamos una actividad adicional en los salones durante el día. Esperamos que este programa ayude a los estudiantes a aprender los sonidos de las letras. El aprender los sonidos de las letras es el primer paso a una buena lectura.

La participación de su hijo es completamente voluntaria y confidencial. Durante estas sesiones, su hijo observará un entrenamiento en vídeo de fonética del Leap Frog Inc. Para determinar lo eficaz de este programa, su estudiante tendrá dos evaluaciones antes y después de su participación por sus habilidades con sus sonidos de letras. Todos los resultados de estas evaluaciones se mantendrán confidenciales.

Si usted tiene más información u tiene alguna pregunta, se puede comunicar a los siguientes números telefónicos: (916) 616-0605 and (707) 972-1569.

Gracias,

SUPERVISOR NAME
School Psychologist

Lisa Yocum
Graduate Student

Quinn Ballard
Graduate Student

☐ Yo doy permiso a mi estudiante, __________________________ a participar en sesión consejería individual.

☐ Yo no doy permiso a mi estudiante, __________________________ a participar en sesión individual de consejería.

Padres/Guardian Nombre (Favor Imprenta)

Padres/Guardian Firma
Fecha

Nombre Estudiante (Favor Imprenta)
Appendix C

CBM-LNF

u o L P K b E j H h
S c a U I K T N L Y
k B H Y M g o Q p W
U W u Q O s A n P i
G o n Z I c L X U i
m E d l j Y p G v B
P c r H K x M i O W
W A N x k l a u Q d
z N X M L e g l C p
A F k j H U z s I L
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CivWmVJzh
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Appendix D
CBM-LSF

aympnevbcfc
zrugcbelkp
gkjynpthf
jubgmatezf
zbiunegmfr
kszydogpuh
wipjognbak
mjcrghvap
kuvoacthnj
ustgjenvlo
ade gtopwyc
zuil joktbc
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hbleztjnmp
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b c z n e y h g r t
s l k g n i j d h p
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e v y l i c s g o u
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wekzfdsijb
gdiefkzwh
duobrcinsp
Appendix E

Leapfrog Video Cover and Manufacturer’s Description
References


Smith, D. (2002). The theory heard ‘round the world: Albert Bandura’s social cognitive theory is the foundation of television and radio shows that have changed the lives of millions. *Monitor on Psychology*, 33 (9), 30.


