

**EVALUATION OF THE
WATERFORD EARLY READING PROGRAM
IN PRE-KINDERGARTEN
2005-2006**

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Abstract

Citation

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Purpose

The purpose of this evaluation is to examine the effects of the Waterford Early Reading Program Level 1 (WERP-1) on early reading development of pre-kindergarten students in Merced City School District.

Setting

Outcomes of the one year study (2005-2006) in six state funded preschool classrooms in Merced, California.

Study Sample

The sample included 198 (86 Treatment, 112 Comparison) preschool students with 57% being Limited English Proficient.

Intervention

Students utilized Waterford Early Reading Program (WERP) Level 1 daily for 12 minutes. In addition, the teachers in both groups utilized the Houghton Mifflin PreK *Where Bright Futures Begin!*

Research Design

Quasi-experimental with equating (QED)

Control or Comparison Condition

Site selection criteria were clearly established with rationale. These included selecting sites with no other literacy intervention programs in place (e.g. Early Reading First) and historically low test scores. The comparison condition utilized the *Where Bright Futures Begin!* but did not utilize WERP.

Data Collection and Analysis

- Statistical controls were used to establish initial group equivalence.
- Treatment teachers and literacy coaches were interviewed to receive feedback on the treatment and implementation.
- To determine differential growth, the analysis was approached through the General Linear Model whereby Group (treatment vs. comparison) serves as the between-subjects factor and Time of Assessment (pre, mid, post) serves as a within-subjects factor.

Findings

- WERP students with at least 1000 minutes recognized upper and lower case letters more quickly (a statistically significant advantage at the midpoint) than the students in the comparison group.

- WERP students scored significantly higher than comparison students in recognizing letter sounds in posttests.
 - Sounds Upper mean gain of 17.34 vs. 11.09, $p < .001$
 - Sounds Lower mean gain of 16.59 vs. 10.86, $p < .001$

Conclusion

- The time students spent using the WERP-1 software gave them an advantage early on in learning phonological awareness, which is a key component for reading and writing.
- The use of WERP-1 for the prescribed time period of 12-minute sessions five days a week appeared to significantly increase these pre-kindergarten students' abilities to identify the sounds associated with letters.
- WERP-1 appears to provide an excellent medium in which to promote phonological awareness as easily and quickly as possible.

Background and Purpose

As a result of No Child Left Behind Legislation of 2001 (NCLB) there are growing demands to improve the academic performance of preK-12 education students. Therefore, it is not surprising that academic expectations for preschool education are increasing in an effort to give children the foundation they need to succeed in elementary school and beyond. In particular, children's performance in regards to early literacy is seen as foundational and essential for later academic success (Kamil, Mosenthal, Pearson, & Barr, 2000; Snow, Burns, & Griffin, 1998). There is also evidence to suggest that children that are unable to acquire emergent literacy skills may remain at-risk throughout their future schooling (Shaywitz, 2004).

Educational technology, including hypermedia and multimedia instructional tools, is one medium that shows promise in building basic literacy skill and fluency for children at all levels (Kamil et al., 2000). Research purports that the most effective use of educational technology appears to be when the objectives of the educational technology are aligned with the curriculum and scaffolding is provided for students (Yelland, 1999), which serves to connect teacher-led instruction and self-guided learning (Ferguson, 2001, in Cassady, 2004). Waterford Early Reading Program Level One (WERP-1) is a software program that aspires to create this type of integrated learning environment.

Given the importance of emergent literacy skills in contributing to students' academic success and the capacity for educational technology to assist with this objective, it seems crucial to vigorously investigate programs such as WERP-1 in order to ascertain if they assist with student learning. To this end, Pearson Digital Learning invited, Heidi Stevenson, an external, independent evaluator to conduct a study on the impact WERP-1 software had on children's early reading development. This study, a quasi-experimental design with equating (QED), took place in six preschools of the Merced City School District from September 2005-June 2006.

The purpose of this QED was to evaluate the effects of WERP-1 on the early reading development of pre-kindergarten students. The study was designed to address the following key research questions:

1. What are the effects of WERP-1 on the early reading development of pre-kindergarten students?
2. What are teachers' and site principals' attitudes toward using the Waterford Early Reading Program?
3. Is the program implemented with fidelity according to the Waterford Early Reading Program?

Methods

Research Design

In view of the practical and financial limitations to conducting research in educational settings the researchers designed this study in an effort to best meet the guidelines outlined in the WWC Study Review Standards.

Given that students were not randomly assigned to classes, the research design was based on a quasi-experimental design with equating (QED). Therefore, the term “comparison” rather than “control” will be used for the classes who did not receive the treatment (WERP-1). Additional design and methodological characteristics include:

- To the extent possible, the comparison and treatment curriculum were similar with the exception of the supplemental curriculum provided by the treatment (WERP-1 use).
- Training was provided to ensure that treatment teachers were knowledgeable regarding WERP-1 implementation.
- Pre and post measures of student performance were included in this study.
- Student usage logs were collected (weekly and then monthly) in an effort to promote fidelity among all treatment teachers, and provide intervention if necessary.
- The Merced City School District (MCSD) measure used adequately evaluates performance on the skills taught via WERP-1.
- A preliminary analysis was first conducted to ensure that no initial systematic differences existed between the treatment and comparison groups on the variables of gender, English language proficiency, and age. The groups also did not differ with respect to receipt of special education services (as indicated by having IEP's) nor grade retention status.
- Site selection criteria were clearly established with rationale. These included selecting sites with no other literacy intervention programs in place (e.g. Early Reading First) and historically low test scores.
- Statistical controls were used to establish initial group equivalence.
- Treatment teachers and literacy coaches were interviewed to receive feedback on the treatment and implementation.
- To see if there was differential growth, the analysis was approached through the General Linear Model whereby Group (treatment vs. comparison) serves as the between-subjects factor and Time of Assessment (pre, mid, post) serves as a within-subjects factor.

The timeline in Table 1 illustrates the timeline of activities for this study. Following is a discussion of the activities and measures, as well as the site and sample.

Table 1. Timeline of Events

Time	Event
August-June 2005	Conduct evaluation
September 2005	Collect baseline student data
October-November 2005	Classroom observations
January 2006	Mid-year student data collection
March-April 2006	Classroom observations
May-June 2006	Collect end of year student data
May-June 2006	Conduct teacher interviews
July 2006	Complete evaluation report

Study Setting

The Merced City School District is situated in the agriculturally rich San Joaquin Valley within a two-hour driving distance of Yosemite National Park in California. It is a multiethnic school district with over 11,200 students in twelve K-5 elementary schools, all with state preschool classes, and four 6-8 middle schools..

Study Population

Site selection criteria. Sites were used selecting using the criteria listed below:

- A Merced City School District site
- Preschool classroom
- Relatively low test scores
- Teacher interest in using WERP-1
- Willingness to fully participate in all components of the study

Additional criteria included: 1) that there were no other language arts supplemental curriculum (in addition to the Houghton Mifflin) being utilized and 2) the student populations of the schools chosen seemed to be similar in regards to socio economic status, English Language Learners (ELL), and students with Individualized Educational Programs (IEP's).

Site Characteristics. Twelve classes at six preschool sites in the Merced City School District were chosen to take part in this study. The three treatment sites each had two computers equipped with WERP-1 software.

- Each school site had a morning and afternoon class.
- Classes had approximately 20 students.
- All school sites used Houghton Mifflin’s Pre-K “Where Bright Futures Begin!”

Student characteristics. One hundred ninety-eight students were included in the final sample. All participants were eligible to enroll in kindergarten the following year (i.e., turning five years of age by August 15, 2005). Table 1 displays demographic information in regards to gender, English language proficiency status, and age for the treatment and comparison groups. Note that only students who had usage time of over 1000 minutes were included in the analysis.

Descriptive statistics are provided for each condition with respect to gender, English language proficiency status, and age in Table 1. Chi square analyses suggest the groups were not significantly different with respect to gender [$\chi^2(1,N=198)= .062$, $p=.803$, 2-tailed] nor language proficiency status [$\chi^2(1,N=197)= .009$, $p=.924$, 2-tailed]. T-tests for independent samples suggest the groups were not significantly different with respect to age [$t(196)= -1.64$, $p=. 103$, 2-tailed] nor receptive vocabulary skills (as measured by the Peabody Picture Vocabulary Test-III (PPVT)) [$t(196)= -0.19$, $p=.853$, 2-tailed].

Table 2. Summary of Participant Characteristics by Condition

Participant Characteristic	Treatment (n=86)		Comparison (n=112)	
	N	%	N	%
Gender				
Male	43	50	54	48
Female	43	50	58	52
English Language Proficiency Status				
<i>Unknown</i>	0	(0)	1	(<1)
Non-LEP	37	43	47	42
LEP (Limited English Proficient)	49	57	64	58
	M	SD	M	SD
Age (as of August 15, 2005 when child must be 5 to enter a public kindergarten class in the same state)	4.1707	.30504	4.1785	.28461
Receptive vocabulary skills (as measured by the PPVT-III Standard Scores in Fall)	70.98	18.26	75.35	18.85

Teacher characteristics. There were seven teachers who participated in the study. All teachers were females and had a minimum of an Associate of Arts degree. Five of the teachers were Caucasian while one was African American and two were Asian American.

The teachers had varying degrees of education. One teacher had an Associate of Arts degree while the remaining six possessed Bachelors Degrees. Of those who had Bachelors degrees three had teaching credentials, and one was in the process of doing the apprenticeship (student teaching) portion of receiving her credential.

The teachers varied slightly in their levels of teaching experience. The teacher with the AA degree had thirty years of experience teaching preschool. The remaining teachers had two to three years of teaching experience in preschool. All but one teacher was in her first year of working for the Merced City School District.

Training and Implementation

Treatment teachers received an initial training session of three hours with a WERP-1 trainer on October 3, 2005 and on October 4, 2005 teachers received an additional 90 minutes of individualized instruction focusing on the WERP-1 area in which they needed assistance. During training sessions teachers were instructed in setting up Waterford for use in their classrooms, addressing absent students, and methods for rotating students through the use computers in an organized manner. There was a demonstration as to the various lessons and activities that students engaged in during their WERP-1 usage time and directions as to how to run various reports. The trainer made reference to other curricular materials that could be used to reinforce concepts being covered by WERP-1 including take-home books, a resource book, and in class videos.

Implementation guidelines. The Merced City School District used Houghton Mifflin's Pre-K "Where Bright Futures Begin!" as their primary curriculum and supplemented students' language arts instruction with WERP-1 software. The only portion of the WERP-1 curriculum that treatment teachers were required to implement was the software portion.

Each child would use the WERP-1 software for twelve-minutes per day five days a week. All treatment classrooms were equipped with two computers installed solely with WERP-1 software. Beginning in the morning a student's name and picture (chosen randomly by the WERP-1 software) would appear on each computer. At that point, the teacher would request that these two students begin completing WERP-1 activities at the computers. When a WERP-1 using student's twelve-minute session elapsed a picture of the next student would appear and the WERP-1 user would alert the next student verbally that it was his or her turn on the computer. The next student would find the computer that had his or her picture displayed, put on the headphones, engage the mouse, and begin the WERP-1 activities for the next twelve-minute session.

This process repeated throughout the hours of instruction for the two sessions daily (approximately 8:00 am to 12:00 pm and 1:00 pm to 5:00 pm). The only times in

which students did not use the computers were during periods of outside play and snack time. These activities were seen as essential for students' well being (both physically and as a part of the classroom community) and therefore no computer use was required at these times. If students were absent the teacher would skip over their names when it came to their WERP-1 session and attempt to make up their sessions upon their return by having them engage in extra sessions.

Teacher usage reports. To ensure that students were exposed to five twelve-minute sessions of WERP-1 software use, or 60 minutes of total WERP-1 use per week, treatment teachers were asked to submit usage reports. The WERP-1 software was capable of producing reports on student use over a specified period of time. The report listed student names, number of scored activities, number of unscored activities, percentage of answers correct, current lesson, and time of WERP-1 use in hours and minutes.

At the inception of WERP-1 use in the treatment classrooms, treatment teachers were asked to run usage reports each week and fax them to the district office. Weekly reports were required to be faxed on Fridays through the end of October. Beginning in November, treatment teachers ran usage reports on a monthly basis and faxed the information on the last day of the month. If teachers neglected to fax the report, or if their report reflected that students were not using the software for the specified 60 minutes per week, they were contacted by the director of the program as to how they could receive assistance. All teachers became proficient at having their students (who were present) use WERP-1 for the required time allotment and therefore there was little variability among usage reports from treatment teachers.

Data Collection

Classroom observations. Classroom observations were conducted for treatment teachers in the Fall (October 2005) and Spring (May 2006). In addition, all comparison teachers' classrooms were observed in the Fall. Classroom observation forms were used to denote activities in which students were engaged. Each observation was approximately twenty minutes in length and the purpose was to gain a better sense of instructional approaches and procedures teachers implemented in their classrooms. Observations in treatment classrooms frequently focused on the implementation of WERP-1 software and particularly student use. Furthermore, teachers were interviewed in the Spring to gain additional insights.

Ethnographic interviews. Interviews were conducted with treatment teachers, the technology support person, literacy coaches, and principals in the Spring (May 2006). The interviews were used to garner information regarding their attitude WERP-1 use, perceived strengths and weakness of the software, fidelity to usage requirements, and general feedback on WERP-1. (See Appendices A-C for the interview protocols.)

Curricula

Supplemental treatment curriculum. WERP-1 addresses reading readiness and emergent literacy skills in an interactive, engaging computer-based environment for twelve-minute sessions five times per week. The program aspires to build phonological awareness and vocabulary; increase the recognition of letter names, sounds, and symbols; master basic print concepts; and experience oral and written language through stories, songs, and rhymes.

Comparison and treatment curriculum. All school sites used Houghton Mifflin's Pre-K "Where Bright Futures Begin!" "This program is a scientifically research-based "hands-on, minds-on" curriculum that aligns with key critical Pre-kindergarten learning goals. Alive with colorful images and rich literacy, this comprehensive, integrated program provides children with the foundational skills they need to succeed as lifelong learners (<http://www.eduplace.com/marketing/prek/>)."

Measures

This section describes the measures that were administered, outlining the items that were analyzed on each measure, and including information regarding validity and reliability.

MCSD. The MCSD assessment is a developmental formative assessment designed jointly by kindergarten and preschool teachers in the Merced City School District. The MCSD assessment was administered three times (Fall, Winter, and Spring) and scored by classroom teachers. Teachers were initially trained in administering and scoring the assessment upon employment and their training is updated annually.

The assessment includes letter naming, concepts about print, and numeracy. There have been no attempts to evaluate the validity or reliability, but kindergarten and preschool teachers have used the MCSD effectively for the past five years. Test items include writing one's name, and color and body part identification. Items that address numeracy include counting, recognizing numbers, number concepts, and shapes. To analyze students' emergent reading abilities there are items that address identifying capital and lower case letters and creating sounds associated with these letters. In addition students are assessed on their ability to copy symbols.

Results

Major Findings by Evaluation Question

1. What are the effects of WERP-1 on the early reading development of pre-kindergarten students?

Letter and sound identification (phonological awareness) are essential skills related to early reading development and emergent literacy. It appears that students who worked with WERP-1 for at least 1000 minutes were able to recognize upper and lower

case letters more quickly (they had a statistically significant advantage at the midpoint) than the students in the comparison group. In addition, treatment students scored significantly higher than comparison students in recognizing both upper and lower case letter sounds in post-tests.

2. What are teachers' and site principals' attitudes toward using the Waterford Early Reading Program?

Pre-kindergarten teachers and principals are excited about the opportunity to use WERP-1 at their sites. All treatment teachers unanimously agreed that if provided with the option to use WERP-1 with students in the future they would eagerly volunteer to use it again. Principals also praised WERP-1 as a supplemental curriculum at their school sites.

3. Is the program implemented with fidelity according to the Waterford Early Reading Program?

Yes, due to the close monitoring of fidelity throughout the use of WERP-1, teachers implemented the program as prescribed (although there was some variation between sites and classes). Each teacher submitted usage reports run through the WERP-1 software to exhibit their adherence to fidelity as understood (five twelve-minute sessions per week).

Detailed Results

1. What are the effects of WERP-1 on the early reading development of pre-kindergarten students?

It appears that using WERP-1 software for the prescribed 12-minute sessions five days a week improved the early reading development of the treatment preschool students. The specific skills that improved included letter recognition and sound identification (phonological awareness). See Table 3 for results.

Table 3. Overview of MCSD Results

	Did the groups differ at any point in time? If so, which group did best?			Was there differential growth? If so, which group “grew” more?		
	<i>Pre</i>	<i>Mid</i>	<i>Post</i>	<i>Pre to Post</i>	<i>Pre to Mid</i>	<i>Mid to Post</i>
ABC’s Upper	No .812	Yes, Treatment .011	No .203	No .190	Yes, Treatment .004	No .796
Sounds Upper	No .119	No .089	Yes, Treatment <.001	Yes, Treatment <.001	No .135	Yes, Treatment <.001
ABC’s Lower	No .689	Yes, Treatment .005	No .085	No .161	Yes, Treatment .004	No .834
Sounds Lower	Yes, Treatment .028	No .068	Yes, Treatment .000	Yes, Treatment .001	No .152	Yes, Treatment <.001
Copy Symbol	Yes, Comparison .011	Not available	No .422	Yes, Treatment .024	Not available	Not available
Writes Name	No .843	No .716	No .742	No .990	No .896	No .934
Colors	No .568	Not available	No .179	No .977	Not available	Not available

Please recall both the treatment and comparison groups were learning letter recognition and phonological awareness skills through Houghton Mifflin’s Pre-kindergarten curriculum “Where Bright Futures Begin!.” An item on the MCSD assessment asked students to identify capital and lower case letters that were presented in random order. At the midpoint MCSD assessment, the treatment students (.011 for uppercase and .005 for lowercase) performed significantly higher on the letter recognition task. By the post-test the treatment students had lost this advantage, but it is important to note that they learned the letters earlier in the year than the comparison group students (see Tables 4 and 5).

Table 4. MCSD Letter Recognition Capital (Upper Case) Letters

Group		Letter Recog. Upper PRE	Letter Recog Upper MID	Letter Recog Upper POST
Comparison	Mean	3.50	15.06	20.52
	N	112	111	112
	Std. Deviation	6.566	8.839	7.483
Treatment	Mean	3.28	18.20	21.87
	N	85	85	85
	Std. Deviation	6.090	8.268	7.188
Total	Mean	3.41	16.42	21.10
	N	197	196	197
	Std. Deviation	6.350	8.715	7.369

Figure 1. Comparison of Upper Case Letter Recognition Mean Score by Condition

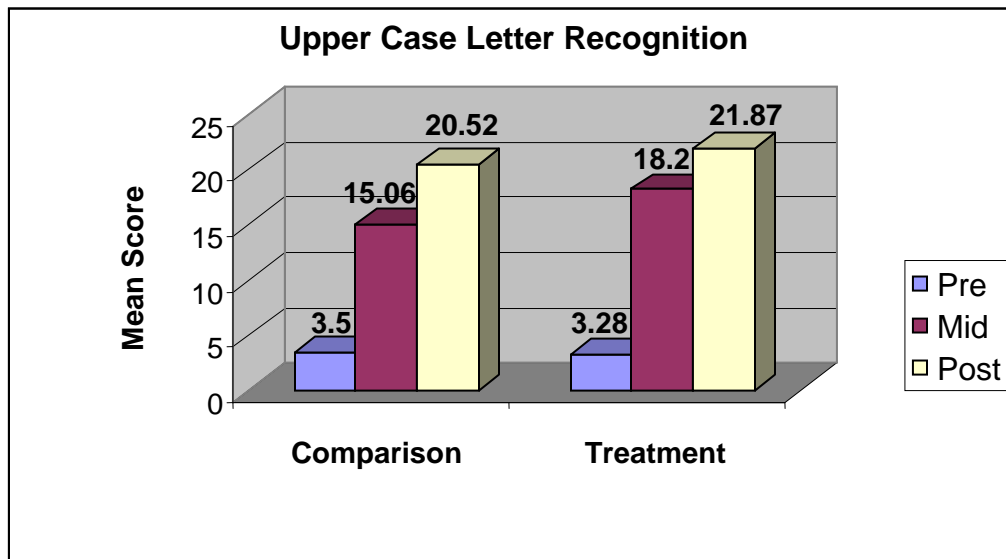


Table 5. MCSD Letter Recognition Lower Case Letters

Group		Letter Recog. Lower PRE	Letter Recog Lower MID	Letter Recog Lower POST
Comparison	Mean	2.21	13.40	19.48
	N	112	111	112
	Std. Deviation	4.738	8.830	7.884
Treatment	Mean	2.48	16.93	21.35
	N	85	85	85
	Std. Deviation	4.900	8.409	7.224
Total	Mean	2.32	14.93	20.29
	N	197	196	197
	Std. Deviation	4.799	8.805	7.644

As shown below in Figure 2, the subgroup who did not contribute mid or post data actually performed less well ($M=.20$) than the subgroup who did contribute mid and post data ($M=.76$). Moreover, this difference was not found to be statistically significant $t(103.459) = -1.274, p = .206$ (after adjusting the degrees of freedom for lack of homogeneity of variance). Thus, the concern articulated in the paragraph above does not appear to be a viable one.

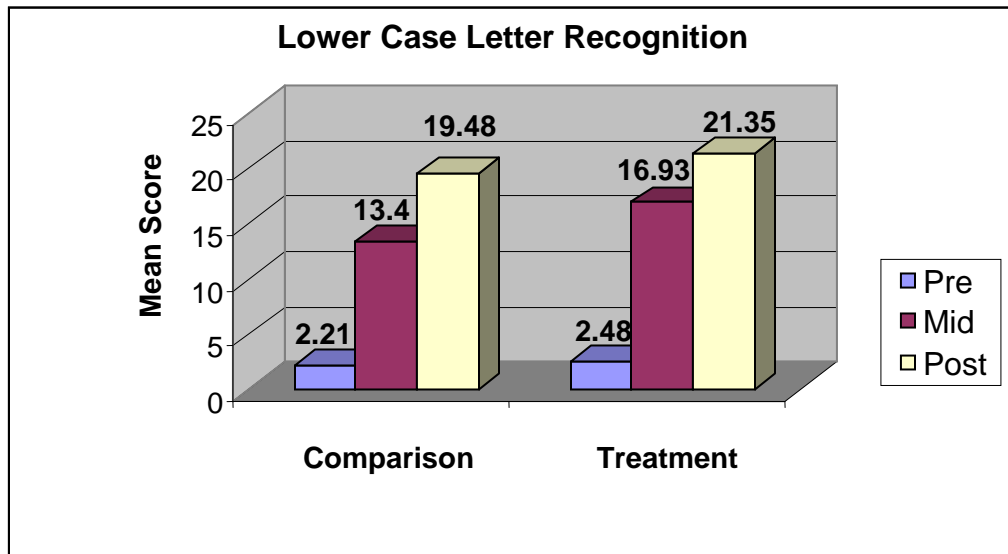
Table 6. Group Statistics

	case without mid or post for mcj sounds upper	N	Mean	Std. Deviation	Std. Error Mean
Sounds Upper PRE	missing mid or post	35	.20	1.183	.200
	assume we have mid or post	76	.76	3.437	.394

Table 7. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Dif	Std. Error Dif	95% Confidence Interval of the Dif	
									Lower	Upper
Sound Upper PRE	Equal variances assumed	3.321	.071	-.942	109	.348	-.563	.598	-1.748	.622
	Equal variances not assumed			-1.274	103.459	.206	-.563	.442	-1.440	.313

Figure 2. Comparison of Lower Case Letter Recognition Mean Score by Condition



The treatment group had an advantage in regards to identifying the sounds associated with particular letters at both the midpoint and post-test on the MCSD assessment. They also exhibited significant differential growth from the midpoint to the post-test and from the pre-test to the post-test (see Tables 8 and 9) It seems that the time students spent using the WERP-1 software gave them an advantage early on in learning phonological awareness, which is a key component for reading and writing. This result is highly valued by teachers, and principals, and of great importance to students' academic success.

Table 8. MCSD Sound Recognition Capital (Upper Case) Letters

Group		Sounds Upper PRE	Sounds Upper MID	Sounds Upper POST
Comparison	Mean	.59	9.34	11.68
	N	111	79	77
	Std. Deviation	2.925	10.923	12.120
Treatment	Mean	1.39	12.29	18.73
	N	85	85	85
	Std. Deviation	3.958	11.132	9.311
Total	Mean	.93	10.87	15.38
	N	196	164	162
	Std. Deviation	3.425	11.097	11.272

Figure 3. Comparison of Upper Case Sound Recognition Mean Score by Condition

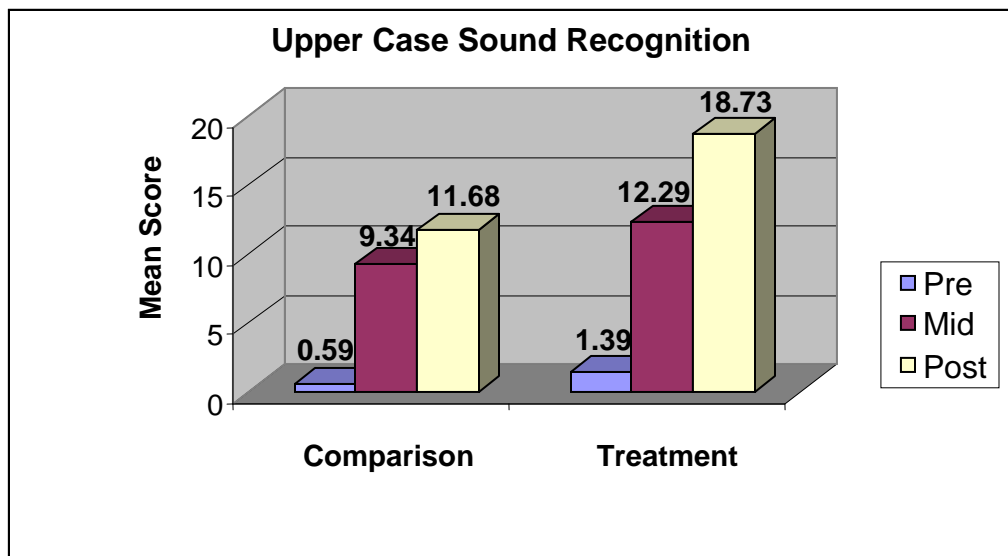
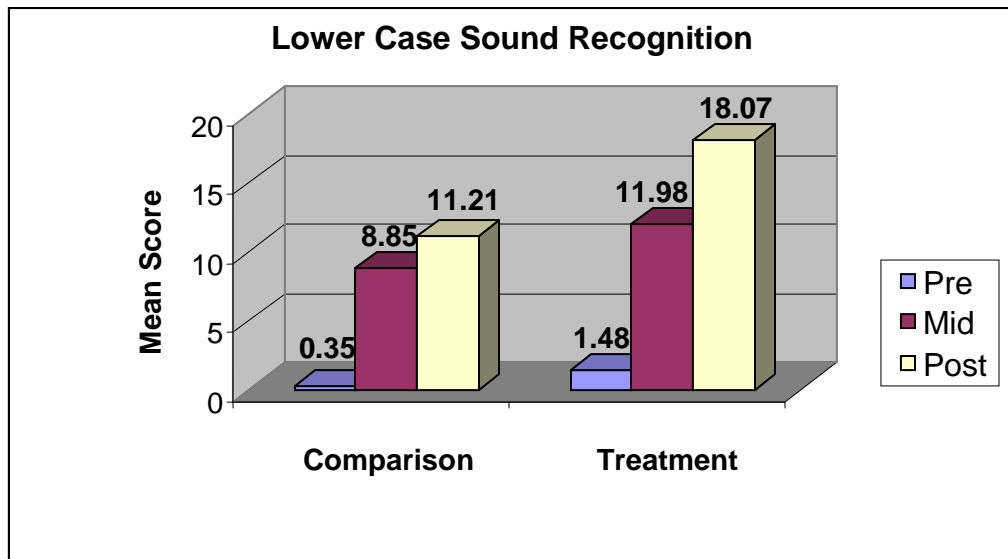


Table 9. MCSD Sound Recognition Lower Case Letters

Group		Sounds Lower PRE	Sounds Lower MID	Sounds Lower POST
Comparison	Mean	.35	8.85	11.21
	N	111	79	78
	Std. Deviation	2.338	10.700	11.824
Treatment	Mean	1.48	11.98	18.07
	N	85	84	85
	Std. Deviation	4.222	11.013	9.766
Total	Mean	.84	10.46	14.79
	N	196	163	163
	Std. Deviation	3.328	10.942	11.302

Figure 4. Comparison of Lower Case Sound Recognition Mean Score by Condition



The ability to copy a symbol is an emergent skill to writing. The MCSD measured this skill at the pre-test and post-test, but not at the mid point. It appears that while the comparison group had an advantage at the pre-test on this item, the comparison group experienced a greater degree of differential growth. The groups were not found to differ on their ability to write their names or identify colors.

Figure 5. Comparison of Copy a Symbol Mean Score by Condition

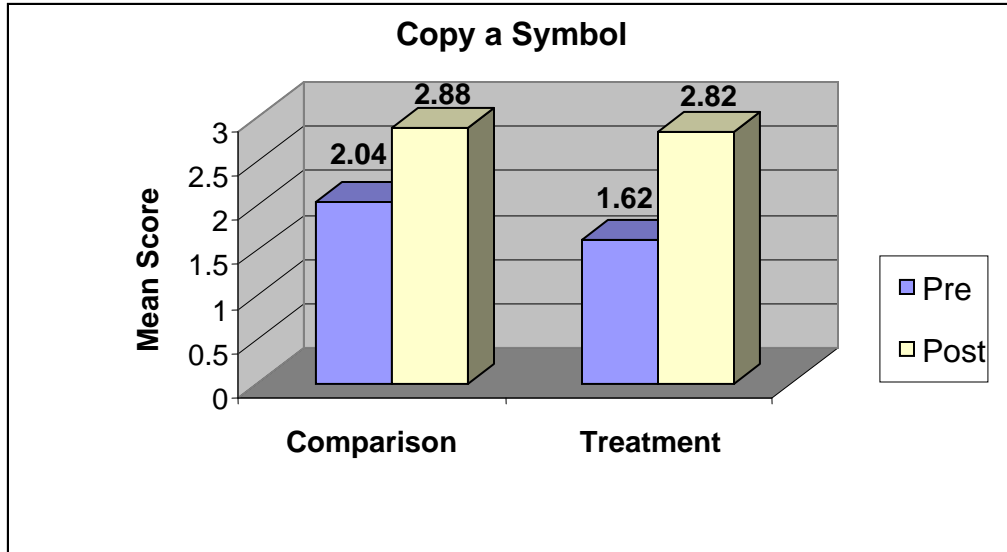
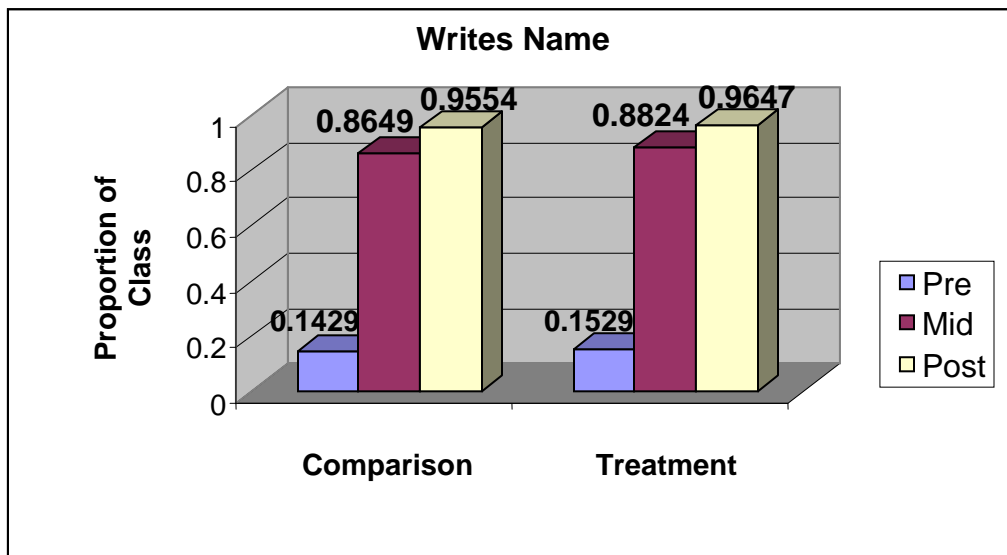


Figure 6. Comparison of Proportion of Class Who can Write their Name by Condition



As one can see, the use of WERP-1 for the prescribed time period of 12-minute sessions five days a week appeared to significantly increase these Pre-kindergarten student’s abilities to identify the sounds associated with letters. Phonological awareness is necessary for success in both the ability to read and spell words. Therefore, teachers, principals, and parents hope to assist children in developing this skill as easily and quickly as possible. WERP-1 appears to provide an excellent medium in which to achieve this imperative skill.

2. What are teachers' and site principals' attitudes toward using the Waterford Early Reading Program?

An ethnographic interview was conducted with three teachers, three principals, two literacy coaches, and the technology support person in order to attain a more detailed understanding of their attitudes and perceptions about using WERP-1 with students. In the interview data corpus there are individuals represented from all three of the comparison sites that implemented WERP-1.

Beneficial traits of WERP-1. In the data corpus there was evidence of many aspects of the WERP-1 program that were beneficial. Among these included it was a good supplemental curriculum that taught basic skills, reinforced teachers' lessons and was a fun and engaging way for students to learn. It appeared to address different learning styles for students at their own pace and ability level, and was able to be accomplished with some degree of student independence. The principals, in particular, liked the data print outs and the idea that the students' work with WERP-1 in their pre-kindergarten education will contribute to their success in kindergarten.

Teachers' views of WERP-1. All three teachers said that if they had the option to use WERP-1 with pre-kindergarten students in the future that they would voluntarily use it. These teachers also commented on the fact that they thought that WERP-1 covered the basics, and two of the teachers made direct reference to the fact that WERP-1 reinforced the skills they were teaching in the classroom. One teacher said, "Yes, it reinforces the content of the curriculum..." Another teacher said, "I would choose to use it because it gives the kids a different program to help."

Principals' views of WERP-1. Principals also seemed to like the WERP-1 program and were happy to have it as a supplemental curriculum. All three principals mentioned that they believed that WERP-1 would give their pre-kindergarten students a distinct academic advantage in kindergarten and were pleased about how their exposure to it may increase students' performance with basic skills. One principal said, "Next year they are going to have kindergarten with all those basics, they don't have to worry about that, they are coming in with that." Principals are also excited to compare the performance of the 2005-06 kindergarten students to the results for the 2006-07 students who attended preschool (hence receiving WERP-1 instruction). As one principal says, "It will be a really neat experience to...compare this year to next year at the same time. And I am sure there will be something significant that we will get to measure. This is exciting!"

Literacy Coaches and Technology Support Person's Views of WERP-1. The literacy coaches and the Technology Support Person also expressed their affinity towards the implementation of WERP-1 in the pre-kindergarten classrooms as they believe it serves as a different form of instruction that is also engaging for students. One literacy coach said, "I would say on the whole the program sold itself. You know there were some in the beginning that said, no, four year olds can't do this. But the program and the

engagement of the kids and looking at what they've learned from it, I think that has made them more positive." The technology support person said, "So it is kind of nice to go and have that one component that's completely 100% at their pace, and at the level they are and then to have that reinforced with what the teacher is teaching in the classroom."

Improvements in WERP-1 for ELL Students. In addition to liking many attributes of the WERP-1 software and the students' performance there were also many recommendations as to how the program could be improved. There were nine mentions among the interviews of WERP-1 in regards to ELL students. The major sentiment was that these students were frequently scared (mentioned by three people) of the computers and resistant to work on them due to language difficulties. Some solutions they provided were to offer directions in various primary languages and/or provide for an adult to work with students at the computer. They also believed that students may benefit from having instruction on computers (possibly books on computers) that consisted of something beyond the "Mouse and More" (this was mentioned by three people).

Improvements in WERP-1 Training and Logistics. There were eight mentions of the need for additional training in the WERP-1 program. The teachers did not feel as if they had the time on their own to become familiar with the lessons and various other support materials such as the take home books (The literacy coaches also found that the print in the take home books was too small and too close together.), resource book, and videos. Teachers wished they were able to align the order of the letters presented in Waterford with that of the Houghton-Mifflin program they are using. The literacy coaches and technology support person realized this alignment was possible, but it seemed that no one had the opportunity or knowledge to easily remedy this situation. In addition, two of the teachers did not like the fact that the order in which the students were called to the computers was completely random. They wished they were able to switch the order. One teacher accomplished this goal by postponing a student until later in the day who was unavailable or late to class. Many of the individuals interviewed felt that the above listed issues could be resolved through training or alterations in the software.

Additional Benefit of Learning Technology. A teacher, parent, and principal were excited about the fact that WERP-1 not only taught early reading skills, but also taught children to use technology skills, which will benefit them in the future. This was best stated by a teacher who exclaimed, "Yes, it [WERP-1] is a good accompaniment to the curriculum, but more important than that, it teaches them computer skills. I think that to me that was more effective, more, for life long [learning]...they'll go to kindergarten and they'll know how to use the computer. They're going to get their letter sounds and that in the classroom..." A principal also commented on the fact that, "Technology is our future...I just like the idea that preschoolers are having access and starting [with technology] that early." One of the teachers, commented on the fact that parents are also excited that students have the opportunity to go on the computer. She said one of the parents asked with excitement, "Oh, my child gets to go on the computer?" So it appears, that for some participants and potentially parents, the technology skills obtained from using WERP-1 were also seen as extremely beneficial.

3. Is the program implemented with fidelity according to the Waterford Early Reading Program?

One of the many reasons WERP was effective in increasing Merced City Unified School District students' early reading development skills is that students used the program as prescribed. Each day, five days a week, students spent twelve-minutes using WERP-1. The usage time is evidenced not only by the students' progress, but confirmed by computer generated usage reports.

Only eight students of the 86 did not receive 1000 minutes or more of WERP-1. Therefore, 91% of the students had a minimum of 1000 minutes using the WERP-1 software. Of those who did not have 1000 minutes, seven of these students were from the Reyes PM class and one was from the Burbank AM class. (Please see Table 10 below for more details.)

Table 10. Cumulative Time (in Minutes) Based on Final Summary Sheet

School Site	N	Subset for alpha = .05		
		1	2	3
10 Reyes PM	19	1075.21		
9 Reyes AM	13		1290.08	
1 Burbank AM	13		1364.77	
11 Sheehy AM	12			1522.00
12 Sheehy PM	12			1533.08
2 Burbank PM	17			1602.82
Sig.		1.000	.704	.627

Means for groups in homogeneous subsets are displayed.

Strategies and Resources. To ensure that the teachers used the WERP-1 software with their students a number of measure were put into place including training, support, and accountability.

The teachers received two different training sessions. The first training was a three-hour introduction to the lessons in the WERP program. The content of the training included an overview of the company and program components, PowerPoint video demonstration on WERP use, technical information on how to set it up in the class, run reports, and lesson content. The following day a one-on-one 90-minute training session with a WERP trainer was scheduled. The trainer visited each teacher's classroom to directly address any personal concerns or questions.

In addition the teachers had a specific technology support person on staff whom they could call and receive assistance in person or over the phone. In the interviews with the literacy coaches they advised that any district interested in adopting WERP should consider having a person to help even though the resource manual is well written and informative. Many teachers benefited from the expertise of the in house WERP expert, particularly at the beginning of implementation.

Usage reports were generated by the WERP-1 software which outlined the details of students' work including, student names, number of scored activities, number of unscored activities, percentage of answers correct, current lesson, and time of WERP-1 use in hours and minutes. The usage reports were faxed to the director weekly for the first two months, and then the reports were provided monthly. The director reviewed the reports and intervened if any teachers were not meet the usage requirements of twelve-minutes of WERP-1 use five times per week for each child. The literacy coaches, WERP support person, teachers, and the director, believe that teachers exhibited excellent fidelity because they were held accountable to provide these computer-generated reports.

Table 11. Average Minutes of WERP-1 Use by Class

School Site	Class Session	Class Average of WERP-1 minute
Reyes	PM	1075
Reyes	AM	1290
Burbank	AM	1365
Burbank	PM	1602
Sheehy	AM	1522
Sheehy	PM	1533

Statistical Information Regarding Fidelity. Beginning with the total number of scored activities that were completed by each child (and based on the full set of 86 students that fit the statistical criteria), the total number of scored activities ranged from 120 to 547 with a mean of 393 and standard deviation of 87.

The total number of unscored activities ranged from 133 to 624 with a mean of 440 and standard deviation of 109. The average percentage for the scored activities ranged from 54% to 91% with a mean of 72% and standard deviation of 9%. The total number of sessions ranged from 39 to 147 with a mean of 117 and standard deviation of 19. A frequency distribution for the final lessons the students attempted at the end of the year is quite varied with students at the various levels: a-z and A-Z. Only 4 students are noted to be finished. The total number of minutes ranged from 443 to 1717 with a mean of 1382 and standard deviation of 224.

Comparisons were made between the treatment classes to see if the class averages varied to a statistically significant extent on any of the quantitative usage variables mentioned above. In fact, differences were found for all five usage measures using ANOVA, multiple comparisons based on Scheffe's method and an alpha of .05. In general, we find the Reyes PM class to be the lowest and the Burbank PM class to be the highest. Sheehy classes tend to be high, as well. The Burbank classes are different with the PM higher than the AM class, overall. In terms of the percentage correct for the scored activities, however, it should be noted that the only classes that differ to a

statistically significant extent are the following pairs: (a) Burbank PM > Reyes AM; and, (b) Burbank PM > Reyes AM.

Table 12. Total Number of Scored Activities

Class Student Attended	N	Subset for alpha = .05			
		1	2	3	4
Reyes PM	19	277.58			
Reyes AM	13		350.08		
Burbank AM	13		406.85	406.85	
Sheehy AM	12			428.33	428.33
Sheehy PM	12			459.83	459.83
Burbank PM	17				474.59
		1.000	.091	.139	.268

Conclusions and Recommendations

Due to the demands placed on K-12 education by No Child Left Behind Legislation of 2001 (NCLB), educational researchers need to investigate ways to improve student performance. Given the fact that emergent literacy skills are essential to students' future academic performance (Shaywitz, 2004), it is imperative to research curriculum that supports the development of emergent literacy skills. WERP-1 software provides an opportunity for students to develop emergent literacy skills through the use of technology.

WERP-1 appeared to be successful in contributing to one crucial aspect of emergent literacy skills, the development of phonological awareness. Test scores on the MCSD assessment show that comparison students out performed treatment students to a statistically significant degree on a phonological awareness measure related to identifying sounds of letters. Also of note is the finding that at the midpoint assessment treatment students had a statistically significant advantage over comparison students in regards to letter recognition (although this advantage was lost by the posttest). Teachers may be able to take advantage of WERP-1-using students' earlier acquisition of letter recognition skills by creating more challenging lesson plans earlier in the school year.

The personnel in the Merced City School District, at the three treatment sites seemed pleased with students' academic performance in regards to WERP-1 and appeared to implement it with fidelity (twelve-minute sessions per day five days a week). All three treatment teachers said they would voluntarily use WERP-1 in the future with pre-kindergarten students. In addition, the principals and literacy coaches thought that the engaging graphics and curriculum of WERP-1 benefited the students. Principals were particularly excited to track students' performance after the completion their first year in kindergarten to see the effects of their preschool experience and use of WERP-1.

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APPENDIX

Name _____ pg 2

6. How did you work WATERFORD into your day?

7. Did your use of WATERFORD change the way you taught early reading? If so, how?

8. What advice would you provide to other teachers preparing to use WATERFORD with their prekindergarten students?

9. What was your level of fidelity to WATERFORD?

10. Additional information you'd like to share about WATERFORD?

Name _____ pg 2

10. What did you find most (and least) effective about integration of WATERFORD at your site?

11. To the best of your knowledge did the teachers' use of WATERFORD change the way early reading was taught at your site? If so, how?

7. What advice would you provide to other school sites preparing to use WATERFORD with their prekindergarten students?

8. What was your perception of the level of fidelity to WATERFORD utilization at your site?

9. Any other information you'd like to share about WATERFORD?

Appendix C
Literacy Coaches and Technology Support Person

Name _____ Site _____ Date _____ Time _____

12. Describe how WATERFORD has been integrated at your site.

What is your role, if any, in supporting WATERFORD use?

13. What do you like best about having your school use WATERFORD?

14. What improvements might you suggest for using WATERFORD at your site?

15. How did the teachers you work with react to integrating WATERFORD? What is your perception of their attitude towards using WATERFORD?

Name _____ pg 2

16. What did you find most (and least) effective about integration of WATERFORD at your site?

17. To the best of your knowledge did the teachers' use of WATERFORD change the way early reading was taught at your site? If so, how?

10. What advice would you provide to other school sites preparing to use WATERFORD with their prekindergarten students?

11. What was your perception of the level of fidelity to WATERFORD utilization at your site?

12. Any other information you'd like to share about WATERFORD?

Appendix D
MCSD Assessment

MATH ASSESSMENT

VERBAL/ROTE COUNT Say, "Count as high as you can starting with one."

/ / 2

1 - 10

ENG OTH TTL

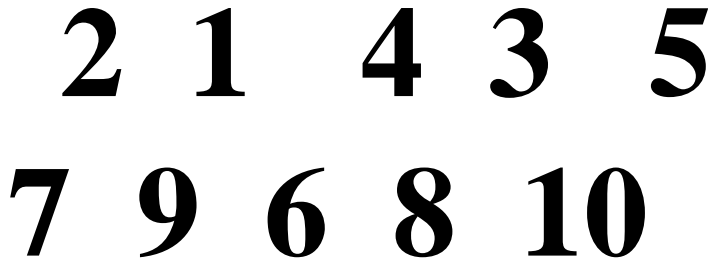
/ 1

11 +

RECOGNIZES NUMBERS: Circle recognized numbers

/ 10

Point to the numbers and say, "What number is this?" Circle numbers named correctly.



NUMBER CONCEPTS: Demonstrates by giving 2 3 5 1 4

/ 5

Say, "Please give me ____" (number).

IDENTIFIES SHAPES: Circle shapes identified

/ 4

Point to a shape and say, "What shape is this?" Circle shapes named correctly.



LITERACY ASSESSMENT

CONCEPTS ABOUT PRINT: Circle known items.

/ 5

Hold a book by its spine or binding and hand it to the child. Ask the questions below. Circle the items the child knows.

1. "Show me the front of this book."
2. "Show me where to read." (Print contains meaning.)
3. "Show me where to start reading." (Beginning of sentence.)
4. "If I start here, which way do I go?" (Left to right.)

5. "Where do I go after that?"

(Return sweep.)

page total

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RECOGNIZES ALPHABET & SOME SOUNDS: Recognition: Upper _____
Lower _____

Circle recognized letters. Check sounds. Sounds: Upper _____ Lower _____

A F K **P** W Z B H O J U C Y L Q M D N
S X I E G R

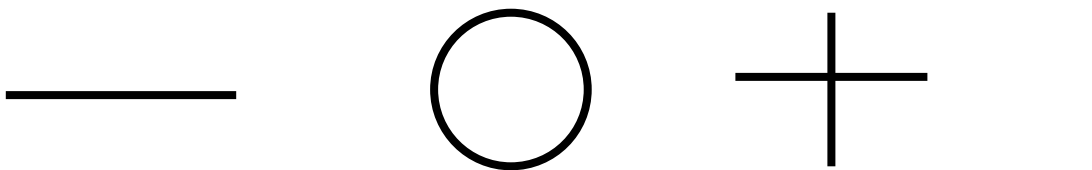
V T a f k p w z b h o j u c y l **q** m d n s x
i e
r v t g page total / 52

DRAW A PERSON:

ENG	OTH	TTL

COPY SYMBOLS:

Assign one point for each symbol copied correctly.



ENG	OTH	TTL

SMALL MUSCLE SKILL: Cuts on a line.

Yes _____ No

TOTAL SCORE	ENG	OTH	TTL	/ 100 pts
	<input type="text"/>	<input type="text"/>	<input type="text"/>	

page total

/ 3

Pre-School

K-5 School

**MERCED CITY SCHOOL DISTRICT
PRE-KINDERGARTEN ASSESSMENT**

ENG	OTH	TTL
<input type="text"/>	<input type="text"/>	<input type="text"/>

Total Score
____/____/____
Date

Student's Name: _____ **Birth Date:**
____/____/____

Primary Language:

Check all that apply: IEP _____ Speech _____ 2/PreK _____ Late Enroll
____/____/____

WRITES OWN NAME: Score should be either 5 or 0.

ENG	OTH	TTL
<input type="text"/>	<input type="text"/>	<input type="text"/>

/ 5

Name must include all letters in sequence with only two reversals to receive 5 points.

PENCIL GRASP: Fist _____ Fingers _____
Right- _____ Left- _____ Handed Uncertain _____

IDENTIFIES COLORS: (1/2 point each)

/ 5

Point to a color and say, "What color is this?" Repeat for each color listed below. Circle colors named correctly.

yellow	black	red	pink	green
orange	purple	blue	brown	white

IDENTIFIES BODY PARTS: (1 point each)

/ 8

Point to the body parts listed below. Say, "What is this called?" Repeat for each item. Circle the body parts named correctly.

back	toes	neck	thumbs
eyes	knees	chin	stomach

page total
/18

Revised 3.30.06