

The Effects of a Pair of Upper and Lower Case Flash games on  
Academic Achievement among Kindergarteners and  
Preschoolers in Letter Recognition and Alphabetical Order

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**ABSTRACT**

Literacy and technology based skills curriculums have become more commonplace in preschool and kindergarten classrooms. Especially in half day programs, children have a large amount of learning they are held accountable for in a short time span. The author developed two flash games focused on letter recognition and alphabetical order accessible through the school's classroom website that addressed both these skills. 12 preschoolers and 20 kindergarteners in a primarily upper middle class community participated in the study. Pre and post-tests were conducted to analyze gains in letter recognition (one of the major predictors of later literacy success) and alphabetical order over the month long implementation of the games' routine usage in school. Parents were surveyed to collect data on home usage and opinions of the flash games. The study suggests that the flash games provided an effective opportunity for independent practice and improvement of letter recognition and alphabetical order. Parent reports were almost unanimously positive and several of their suggestions were acted upon. The author identifies several limitations of the study and how they could be corrected in future studies of this type. The author also suggests some alterations be made to the games to increase their effectiveness. This study provides a template for other flash developers coding educational games to justify their inclusion in the preschool and kindergarten curriculums.

## **INTRODUCTION**

Preschool literacy success is predictive of future literacy success. (Parilla, et. al., 2004) As a preschool teacher, I can speak for my colleagues in our school system and myself to the pressures coming from administrators, literacy specialists, and parents to see our preschool and kindergarten students master more literacy skills. Our preschoolers and kindergarteners participate in a five day, 2 and a half hour program which is broken up with a number of specials. For many of our preschool children, their short academic week is also interrupted with speech, occupational therapy, and physical therapy services. One overwhelming challenge facing teachers in this situation is providing enough structured practice opportunities to children.

Children whose learning environment is embedded with multimedia outperform their peers. This holds true whether the children are in cooperative groups or learning as individuals. (Weiss, et. al., 2006) While it can't be said that a computer can replace a teacher, the research suggests that using a computer to create an interactively functioning learning environment can enhance learning.

Besides having access to computers in school, a significant portion of the preschool population has access to computers at home. Add to those findings that nearly a third of those preschoolers use the computer daily. (Xiamong, 2004)

## **Standards**

Pomfret Community School, where I teach kindergarten and preschool, has adopted the Connecticut Curriculum Frameworks as our own.

Specifically this flash game will support the state frameworks 1.3 initiative in Reading and Responding and 4.1 in Applying English Language Conventions. That is they had to identify and name the letters, and use directionality of print, respectively. For the preschool frameworks, the game supported the development of Cognitive 11 (displaying knowledge of books and print) and Cognitive 13 (identifying

printed words). As related to the school's kindergarten report card, letter identification and knowledge of the order of the alphabet are assessed.

The children played this game in class individually as well as in small groups allowing another important technology education content standard from the Curriculum Frameworks to be met. By completing this activity in groups, the students will identify and develop leadership attributes according to Content Standard 5 k-1.2.

### **Significance of the Study**

If the flash games in this study do help children with letter recognition and alphabetical order, and if it holds true that children that learn in an environment embedded with multimedia see significant benefits over their peers, and if these children choose to use the aforementioned games at home, then said flash games would be an appropriate addition to the curriculum that would help to raise literacy success.

### **Research Hypothesis**

This purpose of this study was to prove that using the upper and lower case games designed by the author had a positive effect on preschoolers' and kindergarteners' letter recognition and ordering of the alphabet skills.

The author aimed to do this by instructing the children how to play the games, providing mandatory playing time as well as having the games be available during center time and at home via the internet, and by conducting a series of pre and post tests. Their scores on the pre and post tests were analyzed individually and as a class. The scores for the letter recognition tests were compared quantitatively. The alphabetical order pre and post tests were compared qualitatively.

The secondary purpose was to gain insight into parents' perception of their child's interactions with the upper and lower case flash games.

Half way through the study, an anonymous survey (Appendix Parent Survey) was sent home to be filled out by the parents. It contained a series of 4 questions about the games and a space for constructive criticisms and suggestions for future games.

### **Potential Follow-Up Activities**

This study could be replicated but future studies should address the flaws discussed later in this study. It should also be noted that the author has developed several other flash games since this study's commencement and those too should be scientifically researched as to their effectiveness supporting children's learning. One might also consider researching the effectiveness of these games on English Language Learners, and children in less affluent environments.

### **REVIEW OF LITERATURE**

Research suggests that a number of kindergarten literacy skills predict reading success in grades 1, 2, and 3. Though phonological awareness was the strongest predictor, letter recognition and naming speed measures were significant predictors. (Rauno et.al. 2004) Further research by Cor et.al. (2005) supports these findings. Their research suggests that rapid naming of letters and knowledge of letters determine the development of word recognition in first and second grade. Relative to this study's suggestion for further research, Finnish speaking kindergarteners and preschoolers saw similar results with respect to naming speed prediction of word reading ability. (Janne et.al., 2005) A study was conducted by Bishop (2003) comparing the predictive measures correlated with assessing kindergarteners between the fall and winter time frames. The study reported no significant difference between assessment's predictive accuracy across the two time frames. The findings of these studies substantiate this study's implementation and assessment of a letter recognition flash game in October.

Research findings suggest that kindergarteners and preschoolers who have access to computers perform better on measures of school readiness and cognitive development. (Li and Atkins, 2004) Findings by Sharon et.al. (2004) stated kindergarteners and first graders attending higher poverty schools had significantly fewer computers and software programs available. Two years later, another study by Sharon et.al (2006) would find to the contrary that higher poverty schools would have significantly more computers for instructions and a smaller ratio of kindergarteners, and 1<sup>st</sup> and 3<sup>rd</sup> graders to computers. While this trend suggests that software such as these flash games would reach more children, the study goes on to note that frequent use of software for reading was correlated negatively with reading achievement. This study hoped to discredit that finding with respect to these particular games.

Another obstacle to the acceptance of these games was the health issues such as obesity that have been blamed on inactivity caused by media use. Findings by Marshall et.al. (2004) offer evidence to the contrary. The findings of their study maintain that there is statistically significant relationship between tv viewing and body fatness among children but it is too small to be clinically relevant. The study goes on to suggest that despite time spent engaged in sedentary behavior is prohibitive of physical activity, media-based inactivity may be unfairly implicated. A study by Ramos et.al. (2005) found that children are experiencing discomfort from the use of computers. That discomfort is not from obesity but rather discomfort in the neck region from poor body mechanics. They suggest occupational therapy as instrumental in teaching proper body mechanics. Teachers will be modeling and assisting preschoolers and kindergarteners in this study with these findings in mind. It is also noteworthy that the computer workstations have been approved as developmentally appropriate by both the occupational therapist and the tech specialist at the school.

A report from the National Center for Children in Poverty (NCCP) stresses using an intentional curriculum. (Klein et. al. , 2007) The NCCP defines an intentional curriculum in part as being scientifically researched. Kaplan and Walpole (2005) echo this sentiment, adding to it that the focus of research should be on studying literacy interventions of preschool children in poverty. While both articles focus on children in poverty, there is no reason why the upper middle class population of the author's school in this study could not benefit from a scientifically research based intervention as well.

A study of kindergarteners preference for learning styles showed that kindergarteners whose learning was embedded with multimedia (both individually or cooperative grouped) outperformed their peers in mathematical assessments. (Itzhak et.al., 2006) In another study, Vernadakis et. al. (2005) concluded that computer use contributes significantly as a classroom learning tool. Their study supported the idea that children learn faster in an interactively functioning environment. They further called out for educators to be trained in the ability to apply new technologies and interact with the student learning process. Sobkin (2004) investigated why preschool age children play computer games. Amongst a number of reasons, those observed by the author during this study were; boredom, the desire to beat an opponent, a desire to gain knowledge, the desire to be entertained, the desire to get better at the game, and the opportunity to work with the computer. These studies support the author learning actionscript 2.0 coding to build interactive multimedia for the children of this study.

The participants in this study used the upper and lower case flash games in small groups in part due the findings of the following studies. A study by Plowman and Stephen (2007) placed in the context of preschool free play found guided interactions supported child learning with technology. Hagstrom and White (2006) found that socially shared talk did not even have to be on task to be beneficial to problem solving when using computer technology. Schmid et. al. (2008)

studied the interactions of tutors and preschool children using computers. Children would seek the assistance of a tutor when problem solving became difficult. However, when a tutor was “uninspired (personality, tired, or new)” the children’s focus turned to the software’s animations and other motivational features. This last study supports the help button that displayed the alphabet on these flash games and the motivational sayings of the author when the “tutor/child/computer triangle” Schmid refers to is “uninspired.”

This study adds to the research by studying the effectiveness of a particular computer based literacy intervention for preschoolers and kindergarteners that is available via the internet for teachers and children to use.

## **METHODOLOGY**

### **Research Design**

This study uses a quantitative design to assess the difference between pre and post test scores on letter recognition. This study also uses a qualitative design to assess the differences between pre and post test narratives related to alphabetical order. The pre and post tests are assessments that are normally completed at this time in our kindergarten curriculum.

This study also combines a qualitative and quantitative design to investigate parent perceptions of the flash games based on survey responses.

### **Sample Population**

The sample population of this study includes 12 preschoolers (1 moved mid study) and 20 kindergarteners from the author’s half day classes at Pomfret Community School in Pomfret, Ct. The sample is primarily upper middle class Caucasian, with the exception of 5 free and reduced meals students, 1 Asian child, and 1 adopted Asian child. The sample population also includes 10 children who receive special education services. Also included were their parents via an anonymous survey. There were 14 responses to the 26 surveys

sent home; 1 response from the parents of twins and 1 did not come back from the child who left mid-study.

### **Timeline**

The pre-tests were administered and scored the week before the flash games went online September 29<sup>th</sup>, 2008. The children played the games for a month and then were given the post tests the first week of November.

### **Specific Goals for Learning**

For the study to be successful, proving the effectiveness of these upper and lower case flash games, the kindergarteners would need to show gains in the number of upper and lower case letters they could recognize from pre to post test, and demonstrate an increased ability in ordering the alphabet. Preschoolers would be required to show gains in upper case letter recognition from pre to post test, and an increased ability in ordering the alphabet.

### **Data Collection**

The pre-tests were different for preschoolers and kindergarteners; however the post-tests were the same as their respective pre-tests. There were 2 components to the pre assessment for each age level; an alphabet recognition test and a second task where the children ordered alphabet tiles.

For the recognition assessment, children were presented a sheet of paper like the assessor's without any extraneous markings (name, dates, etc.). They then were instructed to read all the letters to the assessor who followed along on their own paper. Preschoolers were only asked to recognize upper case letters, where as kindergarteners were expected to recognize both cases.

For the alphabet ordering assessment, the tiles (3 inches square with upper case letters on ones side and lower case on the other) were arranged in a random order on the floor and the children were instructed to line them up in alphabetical order. This assessment most closely resembled how the game

would be played and relied on the skill of alphabet recognition to be completed accurately.

## **Educational Setting**

### **Preschool**

After each individual preschooler's initial guided exploration the upper case flash game was set up on the computers throughout the school day. The children had to use the game at least once per week both individually and in small groups of 2 or 3. They primarily used the games during center time.

### **Kindergarten**

The flash games were introduced as a station during our ELI (Early Literacy Intervention) times for the first week. Groups of 5 children worked together under the guidance of the teacher to complete both the upper and lower case games. A group of similarly skilled kindergarteners remain at ELI stations for 7 minutes then proceed to the next station. There are a total of 4 ELI stations per session.

After the initial introduction to the flash games through ELI, the games were available for children to play after they finished their daily arrival work and during centers. All children completed the developmentally appropriate version(s) individually and in a small group at least once a week.

## **RESULTS AND CONCLUSIONS**

### **Pre-test narrative**

The pre-k had a mean score of 15 on the uppercase recognition while the kindergarten had a mean score of 20. The kindergarten also had a mean score of 12 recognizing the lowercase letters. That 7 of the kindergarteners recognized 25 or 26 uppercase letters made it clear that an exclusively uppercase experience would not be relevant to all children. The author reworked the game to make a second version that dealt with lowercase letters.

As for ordering the alphabet, not a single preschooler completed the objective. The most successful preschooler arranged the entire alphabet with only 4 errors. Nine of the 20 kindergarteners arranged the uppercase alphabet correctly. Three more of the kindergarteners arranged all the letters with only one or two mistakes. One student interestingly enough arranged the letters in the correct order with the exception of a few not being upright (ex. W for M, N for Z). These results also justify the need for a lowercase version of the game and the uppercase as well.

## **Implementation of the games**

### **Preschool**

In preschool, the children are primarily using the uppercase game during center times. Five children a day are being individually instructed on how to use the game. A few preschoolers have reported playing the game at home and that is reflected in their time to complete the task and their familiarity with using a mouse. The average time to complete was a little over 10 minutes. The most significant technical problem was with the mouse; clicking the right button by accident. This causes a menu to open up over the game. That in itself is minor, but for some reason if a tile is being dragged while the right button is down, then its ability to return to its starting x and y coordinates is compromised. The special education administrator found money in the budget to order a mouse designed specifically for children. Though the new mouse all but extinguished the accidental right clicking, the children appear to prefer the standard mouse.

The children continued to use the upper case game in small groups and at least once a week individually.

### **Kindergarten**

In kindergarten, the initial use of the lowercase game was a station during ELI (Early Literacy Intervention) time. The average group time to finish is around 7 and a half minutes, where as the average individual time is closer to 5 minutes. This

practice continued for a week, after which point the games were to be played individually or in small groups during center time and when the students had completed their arrival work. At these times the uppercase and lowercase will be available to play. The children will complete the appropriate version(s) (upper and/or lowercase) for their individual needs individually at least once a week. They were able to play the game in groups as much as time allowed. As with the preschoolers, the children who have used the game at home (seven reported doing so) finished quicker and showed more familiarity with the mouse. The kindergarteners had much less trouble with accidental right clicking of the mouse. More so than with the preschoolers, the appropriately sized mouse eliminated accidental right clicking.

For the remainder of the study, times throughout the half day program were designated for children to complete the version(s) that were appropriate for them. When all the children had their prescribed turns, the games were available during centers and after they finished their arrival work to play as frequently as time allowed.

### **Analysis and Interpretation of Data**

#### **Letter Recognition**

The preschoolers with lower baseline scores realized better gains than their peers between pre- and post-tests with regards to recognizing uppercase letters. The class average was an increase of 8 more letters recognized. Kindergarteners, while as a class realized less of a gain (a class average of 5 more uppercase letters recognized) than the preschoolers, showed similar growth with respects to lowercase letter identification where they realized a gain of 9 more lowercase letters. Individual students made comparative gains based on pre- and post-tests regardless of grade.

Two students scored lower on post-test assessment than their pre-tests. Though I cannot definitely ascertain why this was so, I can speculate on these instances. Pk7 is currently being tested for what is to date an undefined learning

disability. Pk7's academic performance is often inconsistent from day to day. For K18 I have two ideas that may have had an effect on the post-test results. First, being that the pre- and post-tests scores were so close and K18 was at the higher scoring end of the continuum, the trends suggest that we would expect to see less gains from K18. With that in mind, it is possible that some lucky guessing was replaced by actual knowledge and less lucky guessing resulting in a lower score on the post-test. The second set of circumstances that could have had an effect on K18's post-test score was K18's week of absence prior to assessment.

### **Alphabetical Order**

Much like with letter recognition, kindergarteners and preschoolers made comparative gains with respects to alphabetical order based on pre- and post-test assessments independent of their grade level. Unlike letter recognition however, students who were not as successful as their peers saw less or no gains as compared to their peers who were closer to accurately assembling the alphabet. There were two exceptions to the previous statement, K16 and K17 who made large gains. According to parent reporting, K16 played the games everyday before school. While K17 did not submit a parent survey, they were recorded as playing the games almost daily in school.

### **Parent Surveys**

The parent survey (Appendix Parent Survey) asked four questions of the parents with multiple choice answers. The first question asked the extent to which children played the games at home. With the exception of one survey parents reported their children playing the games at least once a week, many daily. One parent did not believe that children should "use electronics at home at this age- (they) read instead." On the other hand, many children reported playing the games with babysitters and over friends' houses daily before their parents got home.

The other three questions were aimed to gain insight to parents' opinions of the games. The first of these asked parents to rate these flash games to which the unanimous choice was "good". The second of these questions asked parents if they thought learning was occurring while their children played these games. One parent chose "no", 5 chose "maybe", and 8 chose "yes" as a response. The final question asked parents if they liked the timer was a way to monitor progress. One parent chose "no", 5 chose "not sure", and 8 chose "yes" as a response.

The final portion of the survey was a box to write constructive criticisms of the games and suggestions for future games. The parents' responses were mostly affirming. The parents reported that their children enjoyed the likenesses of their teachers, their teachers' voices, and competing for the best times. There were some ideas to fine tune these flash games with multiple endings and a way to enter children in a weekly raffle every time they complete a game. There were also suggestions for future games that included matching upper and lower case letters, word families, and math problems. During the course of this study the author did complete an upper and lower case letter matching game that the children are currently using in the classroom.

## **Conclusions**

If I were to do this study again, I would ask the previous years' parents to release their children's scores for these assessments to compare the gains between students with and without access to these games. In retrospect that could have provided a more accurate assessment as to the effectiveness of these games. In addition, I think that the study itself needs more definition. Perhaps there should be two trial periods each followed by assessment; one with usage strictly limited to a prescribed schedule at school followed by a period of unlimited usage at home. Having these two periods (possibly with another class doing the trials in reverse order), would allow the researcher to see more accurately the difference in

effectiveness between school and home. With the author's limited programming skills, research was forced to rely on parent and child reports as to the games' usage at home. Inconsistencies in child reporting and parent reporting should have been foreseen long before the surveys were sent home.

On the other hand, the data could suggest, similarly to one of the parent's comments, that "reinforcement is always good." This set of games seems to have offered those students that were learning the letters motivation and a means to independent practice in addition to what was available in the standard curriculum.

## **IMPLICATIONS**

### **How This Study's Outcomes Add to the Research**

This study adds support to current research. While limitations of the study restrict the author from determining the full extent of the effectiveness of these flash games, this study does suggest that the computer is a valuable learning tool in the preschool and kindergarten environment.

This study acts as a starting point; with a larger sample size and more structured longitudinal design these flash games could prove to be an effective literacy intervention, a scientifically researched and supported addition to the curriculum.

### **Research Questions Raised**

The nature of these flash games containing the likeness and motivational sayings of their familiar classroom teacher might not entice other children. Research should be conducted to examine what effect changing likenesses and sayings on these flash games would have on motivation to play them and learning outcomes.

This study was conducted with a primarily upper middle class sample population. Further research should also ask if a sample population of lower socio-economic status would benefit from these flash games.

Several more flash games were developed by the author as this study was conducted that addressed the limitations of these flash games. Future research should investigate if these upgraded features, such as a score based monitoring system and a smaller number of scaffolded choices, add or detract from the effectiveness of the games.

### **Benefits of Skills for Learners and the Researcher**

During the course of this study several games have passed through stages of the development process; an uppercase and lowercase matching game, a polygon movie game, an apple sorting game, and, most relevant, a counting game based on an upgraded version of the alphabet games in this study. Though this game is very similar in that instead of ordering the alphabet, the user orders the numbers 1-50, the numbers are broken up into groups of 10. The volume is much better and there are also two endings that are randomly chosen when the game is completed. While the users currently testing this last game have noticed these improvements, if programmers viewed the code they would appreciate a growth in the format, efficiency, and execution of actionscript 2.0 by the author from the first games.

Though it could be argued that this study has many flaws and limitedly valid data, the excitement about learning the author has seen these games bring to the children is reason enough to hone programming skills and continue designing and developing games that will hopefully one day be scientifically justified parts of the curriculum.

### **Next Steps for the Research and Researcher**

There are a number of things that I would have done differently and would just have loved to do with these games. However, my lack of programming skills and the crunched time frame within which these games were designed, coded, tested, and put into use, prevented me from accomplishing such features as

- A uniquely randomized layout of letters each time the user played.
- More uniqueness in presentation between the two games.
- A way to print out the end screen to keep track of times.
- A points-based versus time option.
- A variable that would record each child's correct to error ratio and store it in a manner that I could retrieve it. (This feature will probably be out of my abilities for years to come.)

There are some ideas that I would like to go back and incorporate into the games now that I am a slightly more experienced programmer. These new features would include

- Louder sound.
- Speaking the name of the next letter when the help button is pressed in addition to the overlay.
- Multiple endings either generated randomly or based upon time of completion.
- An easier version that limits the number of choices kids have for the next letter, instead of the whole alphabet. For ex., If the next letter is "B" the user would only see buttons for "H-Y-P-O, and the correct letter B".

## APPENDICES

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## Appendix Administrative Permission to Conduct Study

I understand that Brian Martel, a kindergarten/preschool teacher at Pomfret Community School, is going to develop an interactive flash game for the children in his 2008-2009 morning preschool and afternoon kindergarten classes as an independent study for his master's degree.

While developing this game, Brian will be administering pre- and post assessments of the children in his class. Brian will also be surveying the parents with reference to the game as they use it with their children via his school website. Both the pre- and post- tests and the surveys will be presented to Brian's instructor in such a way that no participant can be identified. Brian will use this information to assess the game's value and make alterations within the game's programming that increase its effectiveness. Brian will also use this information to ascertain if other similarly structured games could prove effective.

  
\_\_\_\_\_  
Jane Dion  
Principal

  
\_\_\_\_\_  
date

## Appendix Parent Informed Consent Letter

September 29, 2008

What's Poppin' Parents,

As you may remember from our newsletters, I have developed some simple flash games that are available on the school website for you and your child to enjoy at home. For my Master's degree, I have programmed a much more interactive experience that will hopefully help your child to master their ability to recognize and order the alphabet.

I will be collecting data before and after a period of approximately 1 month of using the game at school. All of the data, which we normally collect during the school year, will be presented to my instructor in such a manner that no child or their score is identifiable. I will also be sending home a quick survey asking a couple of questions about you and your child's usage of the new games.

You can get to the games via links on our classroom website or by typing this in your browser:

Uppercase letters game

<http://www.pomfret.ctschool.net/Classrooms/Martel.B/uppercase.htm>

Lowercase letters game

<http://www.pomfret.ctschool.net/Classrooms/Martel.B/lowercase.htm>

Please feel free to contact me with any questions or comments you may have.

Thank you and enjoy the games,

Mr. Martel

## **Appendix Flash Game URL's**

Uppercase letters game

<http://www.pomfret.ctschool.net/Classrooms/Martel.B/uppercase.htm>

Lowercase letters game

<http://www.pomfret.ctschool.net/Classrooms/Martel.B/lowercase.htm>

## Appendix Kindergarten Pre and Post Test Letter Recognition

Id # \_\_\_\_\_

Pre-Test			Post Test		
Q	W	E lg sht	R	T	Y
U lg sht	I lg sht	O lg sht	P	A lg sht	S
D	F	G	H	J	K
L	Z	X	C	V	B
N	M				

m	n	b	v	c	x
z	l	k	j	h	g
f	d	s	a	p	o
i	u	y	t	r	e
w	q				

Checkmark for positive identification. Circle for correct sound(s).

Tracking consistent-inconsistent l>r r>l top>bottom random  
speed slow - steady - quick

**Appendix Preschool Pre and Post-Test Letter Recognition**

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

Id no#. \_\_\_\_\_

Pre-Test

Post-Test

## Appendix Letter Recognition Pre-test Post-test Data

id	upper case letters pre-test out of 26	upper case post testout of 26	lowercase letters pre-test out of 26	lower case post test out of 26
pk 1	22	25	pre-k will not be formally assessed on lower case letters	
pk2	12	19		
pk3	20	25		
pk4	9	26		
pk5	3	19		
pk6	2	26		
pk7	21	7		
pk8	10	moved		
pk9	25	26		
pk1o	15	25		
pk11	26	26		
pk12	21	25		
pk13	9	24		
<b>pk class avg</b>	15	23		
k1	8	25	0	20
k2	26	26	20	25
k3	25	26	15	24
k4	26	26	21	23
k5	26	26	19	23
k6	24	26	14	25
k7	11	17	0	18
k8	23	26	12	21
k9	17	26	12	22
k1o	25	26	20	24
k11	23	26	13	20
k12	19	26	2	22
k13	1	13	0	0
k14	26	26	24	26
k15	24	26	19	25
k16	14	21	0	20
k17	19	25	9	19
k18	23	26	22	20
k19	25	26	21	26
k2o	23	26	0	22
<b>kindergarten class avg</b>	20	25	12	21

## Appendix Alphabetical Order Pre-test data

*all correct with _____ = entire alphabet correct less listed exceptions.	
id	alphabetical order pre-test
pk 1	random
pk2	correct thru e; self correcting;
pk3	correct thru d but said "I can't find D."
pk4	correct thru c; sang song inaccurately;
pk5	correct thru b then random
pk6	random; couldn't sing song accurately or name letters
pk7	correct thru d; sang song but not match letters 1:1 with song
pk8	correct thru b then random; some letters were upside down
pk9	correct thru h
pk10	entire alphabet with "QSR" and "WYXZ"
pk11	random but knew letter names
pk12	entire alphabet with "D,B" reversed, "KLOQ" and "UWXN"
pk13	random; also added letters to front and back of alphabet
k1	correct thru m
k2	all correct
k3	all correct
k4	all correct
k5	all correct
k6	all correct
k7	random; hesitant to try
k8	all correct
k9	skipped m, n, and f stopped at V
k10	correct thru q with "HRJ"
k11	all correct with "W,M" reversed, some letters upside down
k12	correct thru l
k13	random
k14	all correct with no S or X;
k15	all correct
k16	random
k17	random
k18	all correct with "JKNOQ"
k19	all correct
k20	correct thru k;

## Appendix Alphabetical Order Post-test data

id	alphabetical order post test
pk 1	self correcting inacc.; correct thru B; spelled name in middle of alphabet
pk2	entire alphabet with "LNOP" no M;
pk3	correct thru q
pk4	correct thru m;
pk5	random
pk6	could recognize letters but not order them;
pk7	entire alphabet with "Y,V" reversed and self correcting J and Q
pk8	moved
pk9	correct with hesitation;
pk10	entire alphabet correct
pk11	random but knew letter names
pk12	all correct but "N,O" placed out of order
pk13	correct thru h
k1	all correct with "YNZ"
k2	all correct
k3	all correct
k4	all correct
k5	all correct
k6	all correct
k7	correct thru g
k8	all correct but assembled from right to left
k9	all correct with t out of place; corrected when prompted to check
k10	all correct
k11	all correct
k12	all correct but assembled from right to left
k13	random
k14	all correct
k15	all correct with "S,F" reversed;
k16	all correct with "M,W" reversed and no L
k17	all correct
k18	all correct; over 10 minutes to finish
k19	all correct
k20	all correct

## Appendix Parent Survey

October 13, 2008

What's Poppin' Parents,

I hope you have been enjoying our upper and lowercase flash games at home with your children over these past couple of weeks. You have probably heard that we have been playing them at school too. In the interest of improving upon these games and making more, I'd appreciate if you took a second to give me some constructive criticism about your experiences with these games. Please take a minute to fill out the survey below. Feel free to expand on the shortcomings (or any of the good things) you noticed about these games on the back.

Thanks for taking a moment to help shape the educational experiences of the children in our classroom.

Thanks again,  
Mr. Martel

Please circle the word in *italics* that best reflects your choice.

### How often does your child play these flash games at home?

*never*

*once a week*

*every day*

### How would you rate these flash games?

*poor*

*mediocre*

*good*

### Do you think your child is learning by playing these flash games?

*no*

*maybe*

*yes*

### Do you like the timer as a way to monitor the progress of your child?

*no*

*not sure*

*yes*

### What suggestions do you have that would improve the children's experiences with these flash games? And future flash games?

## Appendix Parent Survey Data

There were 14 responses to the 26 surveys sent home. (1 survey per set of twins, 1 child moved away)

### survey questions

How often does your child play these flash games at home?

never	1	once a week	6	every day	7 *
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\* This includes those surveys that responded with a write in "3 times per week".

How would you rate these flash games?

poor		mediocre		good	14
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Do you think your child is learning by playing these games?

no	1	maybe	5	yes	8
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Do you like the timer as a way to monitor the progress of your child?

no	1	not sure	5	yes	8
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What suggestions do you have that would improve the children's experiences with these flash games? And future flash games?

"I think it is wonderful having your picture and voice, as well as Mrs. Yonush and Mrs. Lima (their likenesses are attached to a 100's chart and maze game respectively). It makes it more fun for (child)."

"(Child) loves your voice and the things you say. She feels very grown-up! More variety between the two games would be good."

"It would be great to have a game where the kid's could actually write out words using letters of the alphabet. Some real math problems (+,-) would be great too. Your encouraging words/phrases in the games are great!"

"You may want to consider changing the colors in the capital letters game. Color blind individuals would have difficulty with the green color scheme (orange as well)."

"We try not to use electronics at home at this age- we read instead."

"(The timer) is not a monitor of progress but it is fun for the child to "beat" their own score."

\_Matching uppercase and lowercase

\_Use in word families ie. Cat, hat, bat, sat.

I

think the games are useful in early learning with preschoolers. By Kindergarten ABC and order of the alphabet should be known by the child but I have to admit reinforcement is always good."

"(Child) loves to use the computer. The positive comments in the game are good. She tires of the game after a few tries. She likes the capital best. Lower case is more difficult for her so she doesn't want to do it as often. She LOVES the "Oh yeah" at (the) end. The only suggestion I'd say is maybe to keep the kids playing often, \_ change the ending praise once in a while. the silly stuff works best. Then they will want to get through it to see what you say next."

"We love the games. We have a chalkboard by our computer with everyone's best time on it. Everyday we have competitions to try to beat our records. Even the adults! My husband loves it!"

"The laptop that (child) uses is set up in the kitchen, which is always a flurry, with many distractions, and we sometimes chat mid-game. So, in reality, if (child) was sitting quietly by (themselves) doing the game, (child) would likely complete it faster. Although, I suppose if you reason that there are always roughly the same number of distractions, I could still watch for consistent improvement in the times, even though the times themselves are not (child's) best. Or better yet, I should move her to a quiet space!"

"Suggestions? The games are really well done, so no improvements come to mind. However, I was trying to think of a way to encourage use of the game at home. This may be difficult to manage, but perhaps each time a child completes a game, his or her name could be entered into a weekly drawing for a small prize of some kind. There might even be a way to incorporate a link at the end of the game that enters the child's name electronically. Don't know what the school rules are about this type of thing. Just a thought, since we all no how far the thought of getting even a sticker can motivate!"