2017

A Child's World: How Electronics Influence Children's Language, Physical, and Social-Emotional Development

Santina Marinelli
Assumption College

A Child's World: How Electronics Influence Children's Language, Physical, and

Social-Emotional Development

By

Santina Marinelli

Faculty Supervisor: Susan Scully-Hill

Human Services and Rehabilitation Studies

A Thesis Submitted to Fulfill the Requirements of the Honors Program at Assumption College

May 2017

Abstract

The present study examines how parents view the role that electronics play in their children's language, physical, and social-emotional development. Children are growing up in a world where technology is incorporated into many aspects of daily life. It has become an element in how children are parented/raised and it is believed to have an impact on children's development. An instrument was developed to survey parents about their perceptions of the role of technology in their children's lives. The survey was distributed to 120 participants. The participants comprised a convenience sample of parents from a New England childcare center with children ages 1-8 years old. Findings suggest that parents do not think the use of electronics is promoting children's development in the areas of language, physical and social-emotional development. However, the results reveal information about how parents might use electronic technology to promote language, physical, and social-emotional development in young children.

Introduction

Imagine that you are a new parent. Suddenly you have to take care of and raise a child. You realize that you are responsible for another human life other than your own. You feel all the pressure of bringing up your child to be healthy, happy, and successful. You want your child to be safe and healthy, and you want him/her to succeed, go to school, and live a happy, independent life. You have to make very important decisions about how and what you feed your child, as well as how she/he will learn and develop. You will have to make decisions about what you think is best for your child at that time. In an ever changing world, parents have to keep up with the new trends, facts, and recommendations about how best to raise their children. In the 21st century, technology is now becoming a big part of our daily lives. It is incorporated into our jobs, schooling, entertainment, and even toys for children. Electronics are now being used as tools and toys to help young children grow and develop, and it is important to determine how helpful they really are.

Technology is everywhere, and it is becoming an increasingly large part in the lives of young and growing children. For example, a mother and son were observed at a gym walking around a track and talking. It looked as though they were using it as a time to get some exercise, talk to each other, and bond. However, the mom was looking at and using her phone the entire time. She did not look up from her phone to make eye contact with her son and engage in the conversation. Is the mother modeling for her young child that this type of social disconnection is okay? Is he being subconsciously taught that he does not need to look at and interact with the person he is talking to?

Another example similar to this is of a family sitting together in a restaurant eating

dinner. The mother, father, and older sibling were sitting and talking while the young boy was

disconnected from the rest of them with an electronic tablet. When the food came, the parents

tried to tell the boy to put away the tablet while he was eating, but he protested and caused a

scene because he wanted to keep playing. He ended up eating his dinner as fast as he could so he

could go back to playing with the tablet. He was completely disconnected from his family with

the tablet that the restaurant provided. If the little boy did not have the tablet, but had a paper and

crayons instead, maybe he could have included the rest of his family by playing tic-tac-toe with

his sibling, doing a word search with his mom, or by drawing a picture of things he sees around

him. These examples show the increasing role of technology in our daily lives and in the lives of

children as well. How do the parents view this role that electronics are now playing in the lives

of their children? It is important for parents and caregivers of young children to think about the

role that electronics play in children's development in order to determine how they can most

effectively help children learn and grow in the best way possible.

Few people consciously think about how toys are marketed to sell and grab the buyers'

attention toward a product. Parents want products and toys that will promote their child's

development, and seeing toys with packaging that relate to this is alluring. If parents and

caregivers are not aware of what types of toys are best for their child, they could end up spending

money on fancy toys that can deprive children from their own creativity and imaginations

(Levin, 2000). Parents can access information from many different sources about how these toys

can help or hurt their children. They may hear from a friend or neighbor that someone else's

child is doing well in school because of a kid-friendly application (app) on an iPad, or they might

read on the internet about how new and sophisticated learning techniques are implemented in the latest products. With near limitless information on the internet, a question that a parent may have can be simply searched, and over hundreds of thousands of answers will appear in seconds. The ease of the internet may discourage the use of published books and articles about raising children that were popular in the past, and some sources of information and advice on the internet may not be credible. In contrast, however, the internet may provide parents with access to resources they would not otherwise have been able to obtain.

Looking at how using electronics impact children's development is an important topic to research because technology is used in so many different areas of life today, and it is incorporated into everything that we do. Children are constantly surrounded by it, and it is becoming an increasingly regular part of their world. The present study will look at how parents think their children benefit from these electronics as they are growing and learning, or if it has negative consequences for their development. This is significant to parents and caregivers because they need to know what is best for raising children in order to bring up a happy, healthy, and independent child.

Literature Review

In the 21st century, we depend on technology for a multitude of reasons. We use it for work, entertainment, reading, learning, and communication. It has become a vital part of our day-to-day lives, including the lives of growing children. It has become incorporated into how children are raised and how they develop. There are games and apps on iPads, smartphones, tablets, and computers that companies claim will help certain aspects of a child's development. There is research to suggest that screen time and electronic toys can both help and hinder

children's development. The present study will look into parents' perceptions of how electronics impact their children's language, physical, and social-emotional development. For the purpose of this study, the terms "technology" and "electronics" are operationally defined as devices with screens such as Smartphones, iPads, Kindles, Tablets, Computers, and Laptops. The definition does not include the television or educational technological devices such as the "Leapfrog."

As children are increasingly exposed to electronics at a young age, it can become habitual and part of their daily lives early on, which may cause problems later in their development. According to the American Academy of Pediatrics (AAP), children are spending close to seven hours per day on electronics (American Academy of Pediatrics, "Media and Children," 2015). It is recommended by the AAP that screens and electronic devices for infants under two years of age should be avoided, because their brains are developing quickly and they learn better at this age through interacting with people rather than screens. They also recommend that children do not spend more than one or two hours per day on electronics, and instead engage in imaginative and outdoor play, hobbies, and reading (AAP, "Media and Children," 2015). A survey conducted by Clements (2004) investigated how often children today in the USA participate in outdoor play in comparison to the generation of their mothers. Results from the survey show that 70 percent of mothers reported playing outside when they were children, while only 31 percent of their own children do. The survey also found that 78 percent of mothers reported playing imaginative games regularly while only 57 percent of children today play creative, or made-up games (Clements, 2004). The author concluded that there is a decrease in the amount and frequency with which children today play outdoors, and reports from mothers show that electronics and computer games contribute to this lack of outdoor play (Clements, 2004). These findings along

with the recommendations made by the AAP show how much technology has impacted children today, and the possible developmental issues that can occur.

Impact on Language Development

Vital components of child development are language and communication skills, and there are concerns that electronic devices can hinder the development of these important skills in children. Specifically, they can affect the communication and language spoken between parents and children. Results from a study by Wooldridge and Shapka (2012) suggest that children's language development may be affected by electronic toys by reducing communication with the parent (Wooldridge & Shapka, 2012). This was concluded by conducting a study where play was observed between the mother and child in two sessions: one with electronic toys and one with traditional toys. There was less communication between the child and parent when they played with an electronic book. Certain features in electronic toys can inhibit the child and the parent to engage in make-believe and communicative play, and parent-child interactions can be compromised as a result (Wooldridge & Shapka, 2012). This can be harmful to children's development because they are not speaking as much and not using verbal communication skills.

In agreement with the results from the Wooldridge study, a recent study published by Sosa (2016) investigated how different toys (electronic, traditional, and books), effect the interactions and communication between infants and their parents. The results also showed that both the children and the parents spoke less during play with the electronic toys than with books (Sosa, 2016). The study concluded that playing with electronic toys in comparison with books decreased the quality and quantity of language by the child and parent (Sosa, 2016). The setup of this study was similar to the Wooldridge study in which they observed parent-child interactions

during play with different toy sets (Sosa, 2016). Sosa found that there were less content-specific

words, parental responses, and conversational turns through play with the electronic toys. It was

concluded that play with electronic toys rather than traditional toys should be discouraged in

order to promote early language development in children (Sosa, 2016).

     In contrast, although much research suggests that electronic toys inhibit language and

communication, a study published by Bergen and Hutchinson concluded the opposite. Children's

play was examined using the Laugh & Learn Learning Home toy, which had electronic features

embedded in it. After analyzing the results, it was concluded that social interaction between the

child and parent was supported (Bergen & Hutchinson, 2009). The children's language and social

interactions with their parent increased over time in the play sessions, and the study concluded

that this toy elicited parent-child communicative interactions (Bergen & Hutchinson, 2009).

     Similar to this study, McPake, Plowman, and Stephen (2013) conducted a study that

investigated how the role of digital toys in children affect early communicative experiences.

They concluded that technology like cell phones, computers, and electronic toys have the

potential to facilitate and expand children's communicative interactions (McPake, Plowman, &

Stephen, 2013). The children in this study already had greater exposure and developed

knowledge to technologies by the time they started school, specifically in communicative

experiences (McPake, Plowman, & Stephen, 2013). This distinction in the literature shows that

technology can also be useful in certain ways. It is possible that if age-appropriate toys are

developed well, that it can enhance development in children (Wooldridge & Shapka, 2012).

Impact on Physical Development

Along with language and communication, physical development is also affected by

technology and electronics in children. There is some recent literature on how physical activity

and screen time affect physical development in children, and they all have similar conclusions. A

study conducted by Maher, Olds, Eisenmann, and Dollman (2012) investigated the relationship

between screen time and physical activity on the risk of being overweight. It was concluded that

the likelihood of being overweight was increased by the amount of screen time rather than the

amount of physical activity, and these results were more consistent in boys rather than girls

(Maher et al., 2012). Maher et al. also found that following the recommended screen time

guidelines would be more effective than following physical activity guidelines in decreasing the

likelihood of being overweight. Similarly, a study conducted by Laurson, Eisemann, Welk,

Wickel, Gentile, and Walsh (2008) investigated the influence of the recommendations of screen

time and physical activity. However, their conclusions were slightly different from those of the

Maher study. Laurson et al. found that both screen time and physical activity simultaneously

affected the likelihood of obesity, and that children who did not follow either of the

recommendations were more likely to be overweight than children who did. Thirty-five to forty

percent of children who did not follow the guidelines were more likely to be overweight

(Laurson et al., 2008). A study by Wethington, Pan, and Sherry (2012) also investigated the

effects of excessive screen time in school-aged youth. Wethington et al. concluded that more than

one fifth of children are at an increased risk of obesity because of the excessive use of screen

time and televisions in their bedrooms, and that there is a challenge in public health to increase

awareness about these effects. All three of these studies have similar conclusions in that physical

development is affected negatively as a result of screen time use.

Although screen time and technology can negatively influence physical development,

there are ways that it can be used positively. In the article "Technology Integration: Defining

what is Appropriate for Young Children" by Armstrong, Donohue, and Highfield, (2015),

suggestions are made about how technology can enhance physical growth in children rather than

prevent it. Armstrong et al. suggest that technology can be used to create movement and physical

activity by letting children create music and make up dances by using the internet, or create play

scenarios by using apps that teach them about nature and the environment.

Impact on Social-Emotional Development

Social-emotional development is also an important part of a child's development.

Armstrong et al. explains ways to enhance social-emotional development using technology, like

having children work together to make a video or learn about people in other places. It can help

develop their social skills rather than hinder them. One study done by Heft and Swaminathan

(2002) investigated how computers impacted the social behavior of preschoolers. They observed

children using developmentally appropriate computer software for two months, and analyzed the

interactions between the children, the teachers and children, and any conflicts that arose (Heft &

Swaminathan, 2002). There were mixed positive and negative results after this study. Heft and

Swaminathan (2002) found that if a child spoke to another on the computer, sometimes they

would be ignored. However, some of the children were cooperative and wanted to share the

computer with each other, while conflicts arose when the children did not want to share (Heft &

Swaminathan, 2002). The study concluded that although the children in this study did use the

computer individually, it can still provide a good social environment when used appropriately. A similar study made the same observation that the children interacted with each other even though they were meant to use the computer alone (Freeman & Somerindyke, 2001). These studies give the implication that technology can be used to enhance children's social-emotional development when used appropriately.

Conclusion

The role of technology and electronics in our culture today makes an impact on how people live their lives, and especially on how children are being raised. They are being exposed to technology early on and there are concerns of whether it is helping or hindering their development. Research is showing both positives and negatives in regards to electronics helping language and social-emotional development, while most research points toward screen time negatively impacting physical development. It appears that it is important for both parents and childcare providers to take into consideration how different devices can be used appropriately to help children's development, rather than hinder it. However, understanding what parents think about this subject is the first step to aiding children's development.

<div align="center">

Methodology

</div>

The primary research question that the present study attempts to answer is: How do parents view the role that electronics play in their children's language, physical, and social-emotional development? In order to answer this question, a survey was sent out to parents of children ages 1-8 using Survey Gizmo (see Appendix A). The survey was comprised of questions and statements designed to collect information from parents based on their perceptions of

electronics and technology and how they impact their child's language, physical, and social-

emotional development.

Participants

Before participants could be recruited for the study, an Institutional Review Board (IRB)

application was filled out and approved (see Appendix B and C). After the IRB approval, the

present researcher utilized a convenience sample of participants who are parents of children ages

1-8 years old from a local child development center. The director of the center was contacted,

and an email was sent out to all of the parents with the embedded link to the survey. About 120

parents received the survey, and the goal was to receive at least 35 responses. Participants had to

agree to an informed consent statement which was embedded in the link to the survey (see

Appendix D). The responses were kept confidential, with no participant names attached to the

actual survey.

Survey Design

The survey consisted of 30 statements that was designed using a 5-point Likert scale in

which the responses to the question will indicate the degree to which the participant agrees or

disagrees with a statement (Simply Psychology, "Likert Scale," McLeod, 2008). After

participants completed the survey, they were directed to the National Association for the

Education of Young Children (NAEYC) Position Statement that outlined the effective use and

potential harms to the use of technology with children (see Appendix E).

Results

A total of 63 responses were received from the survey through the use of Survey Gizmo. A report was generated that showed the responses and correlating percentages. The ages of parents that responded ranged between 27 years old and 46 years old. The average age of respondents was 37 years old. About 70% of the responses were completed by females, and about 30% were completed my males. The ages of children that the parents reported ranged from 7 months to 15 years old. The average age of the children was about 4 years old. The survey aimed to look at parents perspectives of electronics in three areas of their children's development: language, physical, and social-emotional.

Language

Based on the results of parent perceptions, most of the questions that had to do with language development pointed to the fact that electronics are not promoting language development. Question 13 stated: *Electronic toys increase my child's communication during play.* This is the response shown as the report generated in Survey Gizmo:
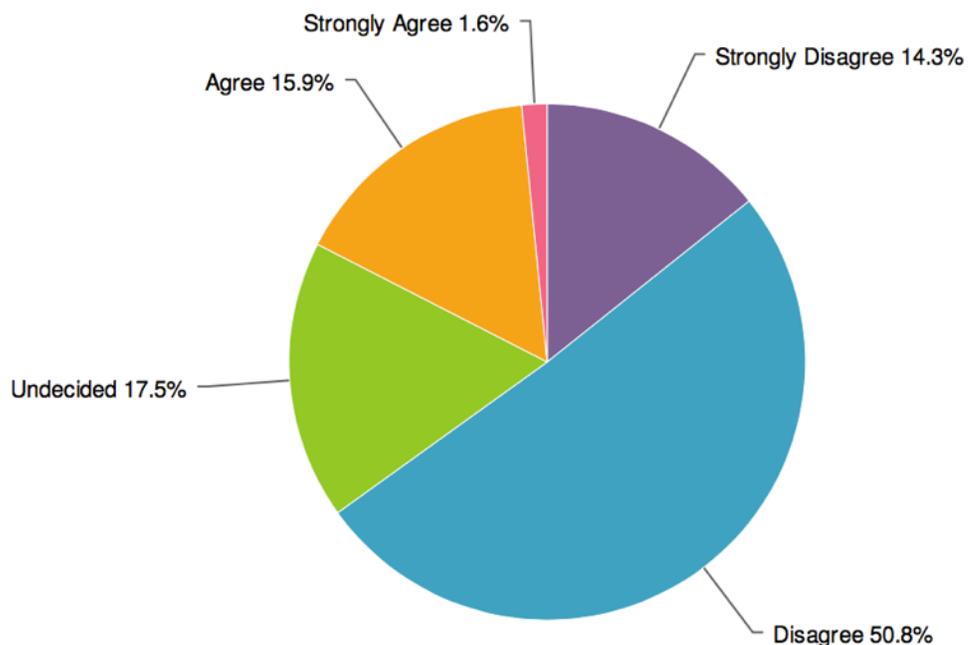
Although some responses were undecided, 50.8% of parents disagreed, while 14.3% strongly disagreed that electronic toys were increasing communication during play.

Question 14 stated: *My child uses electronics more for entertainment than education.* 15.9% of parents responded as undecided. A total of 57% of parents either agreed or strongly agreed that their child uses electronics more for entertainment, and a total of 27% disagreed or strongly disagreed with that statement.

Question 18 stated: *I use electronics to encourage my child to read.* The responses to this question were a little more evenly distributed than others:
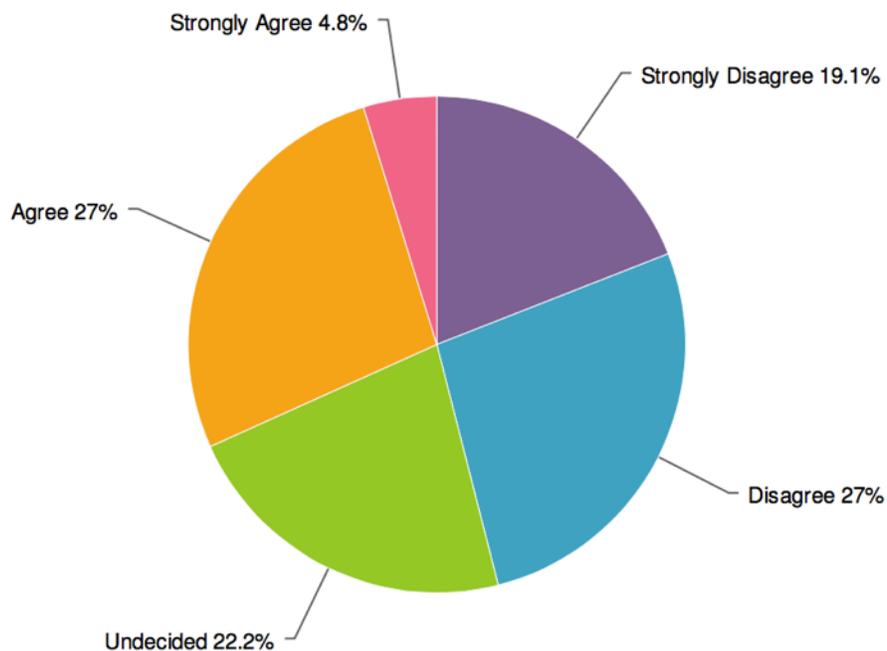
While 22.2% of parents were undecided, a total of 31.8% agreed or strongly agreed, and a total of 46.1% disagreed or strongly disagreed that they encourage their child to read using electronics.

Question 19 stated: *My child prefers reading on a screen than with printed material.* Only

4.8% of parents selected "strongly agree" for this statement. A total of 68.3% of parents

disagreed or strongly disagreed. About 27% responded as undecided. The responses to this

question showed that most children prefer reading with printed material, rather than on a screen.

Question 24 stated: *My child talks more when using electronics.* This question was

similar to question 13, but the responses were slightly different:
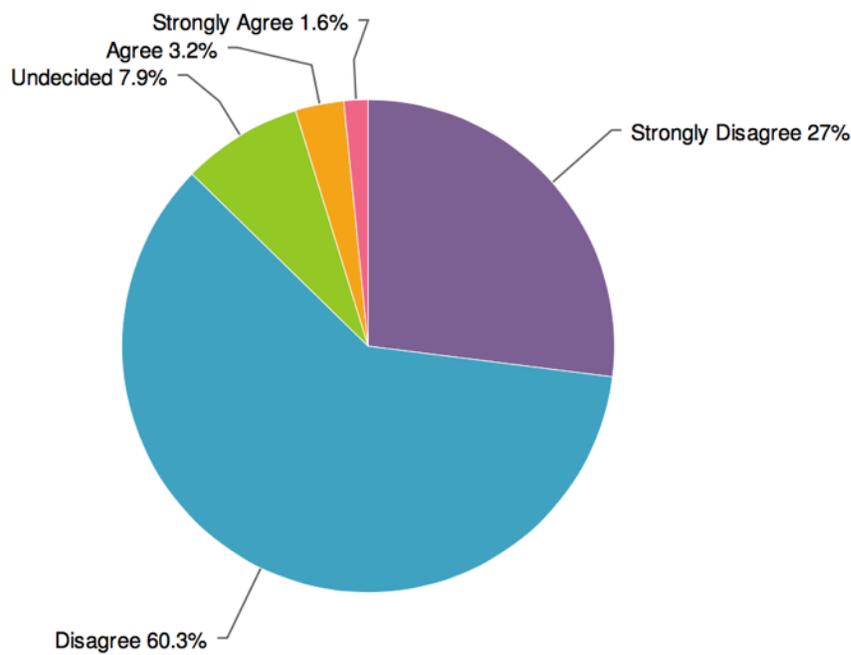
A total of 87.3% of parents either disagreed or strongly disagreed with this statement. Only 4.8%

agreed or strongly agreed, and 7.9% were undecided. The responses to this question show that

most parents who participated in this survey think their child talks less when using electronics.
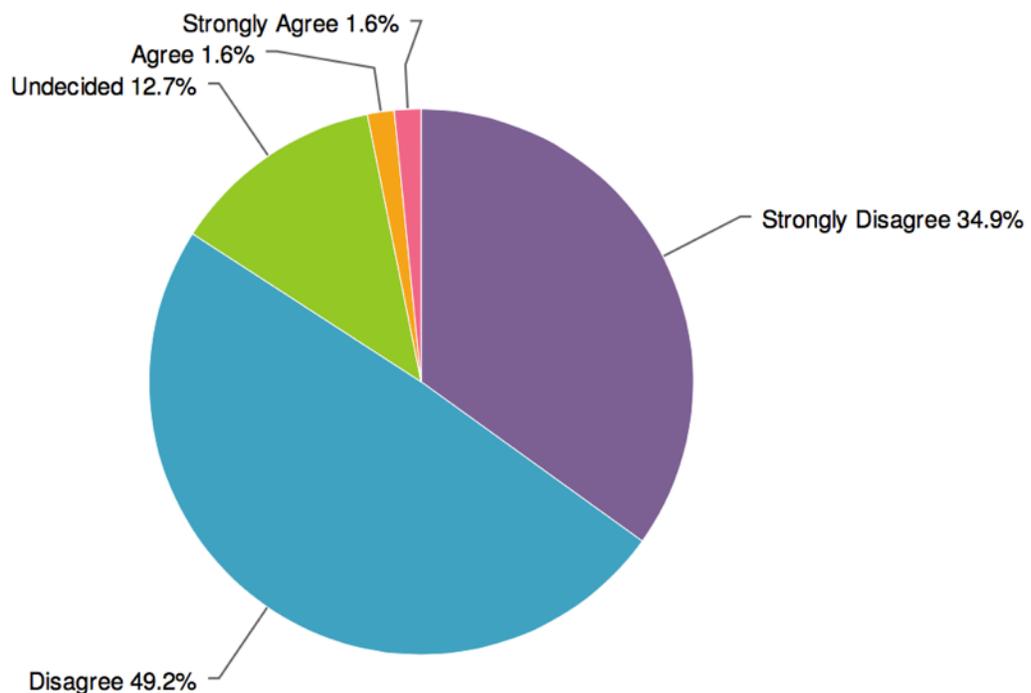
Question 27 stated: *My child picks up language from games on electronics.* 27% of

parents were undecided, and a total of 54% of parents agreed or strongly agreed with this

statement. A total of 19.1% disagreed or strongly disagreed.

Question 28 stated: *The use of electronics is promoting my child's language development.* A total of 39.3% of parents agreed or strongly agreed with this statement, and 36% disagreed or strongly disagreed. 24.6% were still undecided. The parent responses to this question show that a high percentage of parents think that electronics are promoting their child's language development in some way.

Physical

Based on the results from parents perceptions, the data from the questions about physical development points to the fact that electronics themselves are not promoting physical development. Question 10 stated: *Electronic toys help my child be physically active.* This is the response shown as the report generated from Survey Gizmo:

As the results above show, a total of 84.1% of parents disagree or strongly disagree that electronics are helping their child be physically active. Only 2 out of 63 respondents agreed and strongly agreed with the statement, and a total of 52 respondents disagreed or strongly disagreed.

Question 20 stated: *My child engages in more outdoor play than using electronics inside.* Only 16% of parents disagreed or strongly disagreed with this statement. A total of 73.1% of parents either agreed or strongly agreed. 11.1%, or 7 respondents were undecided.

Question 29 stated: *The use of electronics is promoting my child's physical development.* This question was similar to question #10, and the results were very similar:
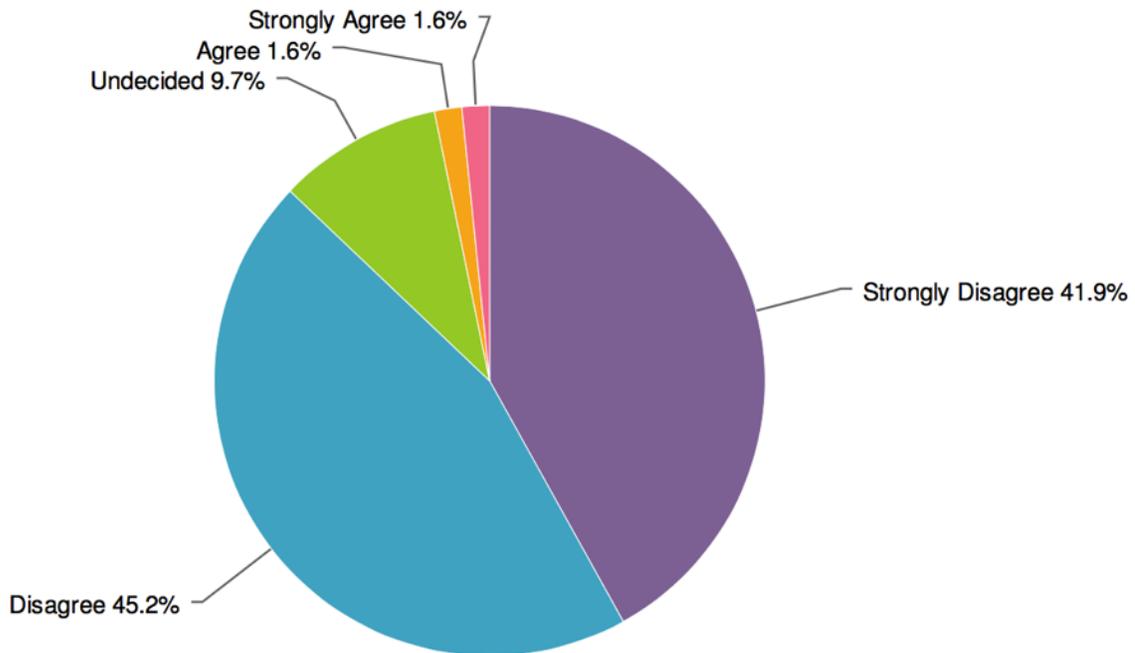

Social Emotional

Question 12 stated: *My child does not interact with others when playing a game on an electronic device.* 50.8% of parents responded with agree or strongly agree, while 39.7% of parents disagreed or strongly disagreed. Only 9.5% (6 respondents) were undecided.

Question 17 stated: *It is difficult to take an electronic device from my child.* 58.8% of

parents agreed or strongly agreed that it is hard to take a device away from their child. A total of

39.7% of parents disagreed or strongly disagreed with this statement. Only one participant

responded as undecided.

Question 23 stated: *My child interacts with me less when using electronics.* Most parents

agreed with this statement:
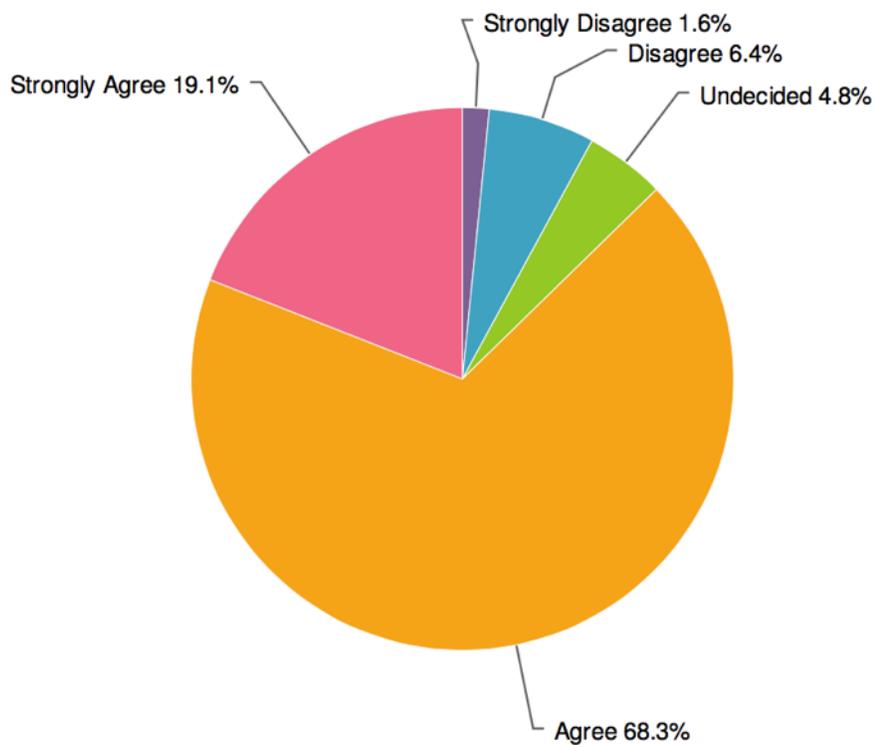
A total of 87.4% (55 out of 63 respondents) agreed or strongly agreed with this statement. Only

8% (5 respondents) disagreed or strongly disagreed that their child interacts with them less when

using electronics. Three parents responded as undecided.

Question 25 stated: *My child prefers using electronics than interacting with others.* These are the

results generated from Survey Gizmo:
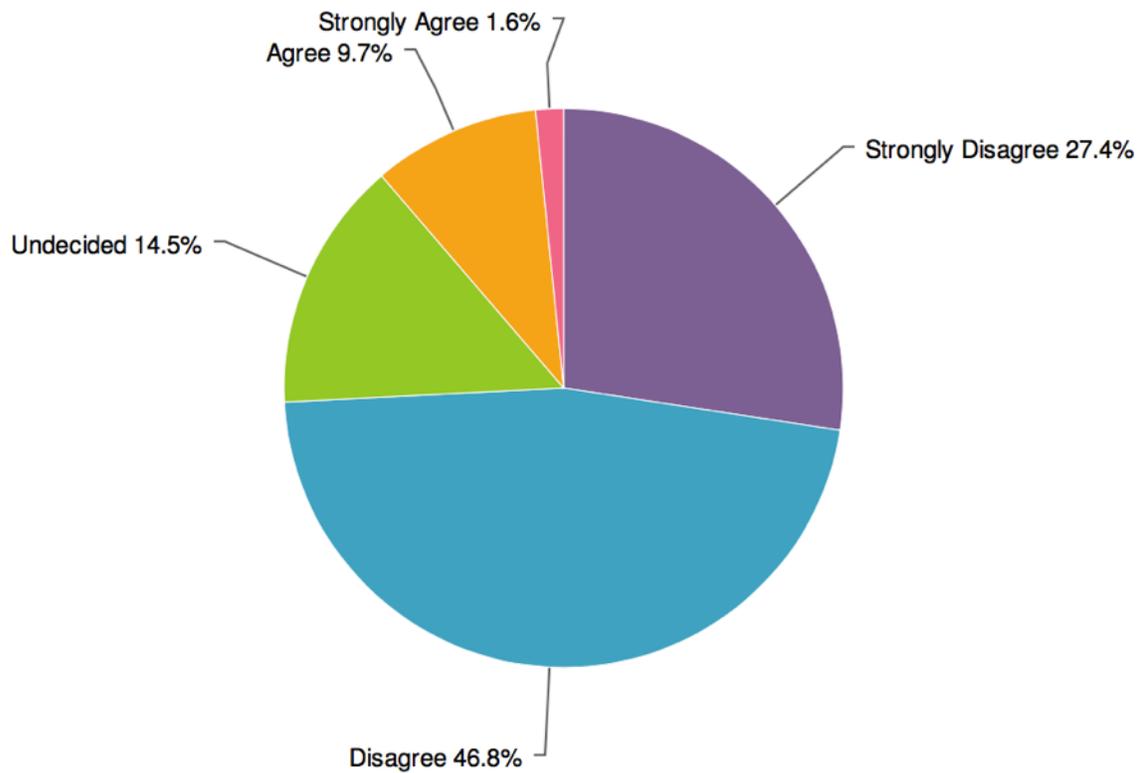
A total of 74.2% (46 out of 62 respondents) of parents either disagreed or strongly disagreed that

their child prefers using electronics over interacting with others. A total of 11.3% (7 respondents)

agreed or strongly agreed with this statement. Only 9 parents responded as undecided.

Question 30 stated: *The use of electronics is helping my child's social-emotional*

development. More than half of the participants disagreed with this statement:

As the results above show, a total of 66.6% (42 of 63 respondents) disagree or strongly disagree with this statement. Only 8% of parents (5 respondents) agree or strongly agree with this statement. 25.4% (16 respondents) were undecided about this statement.
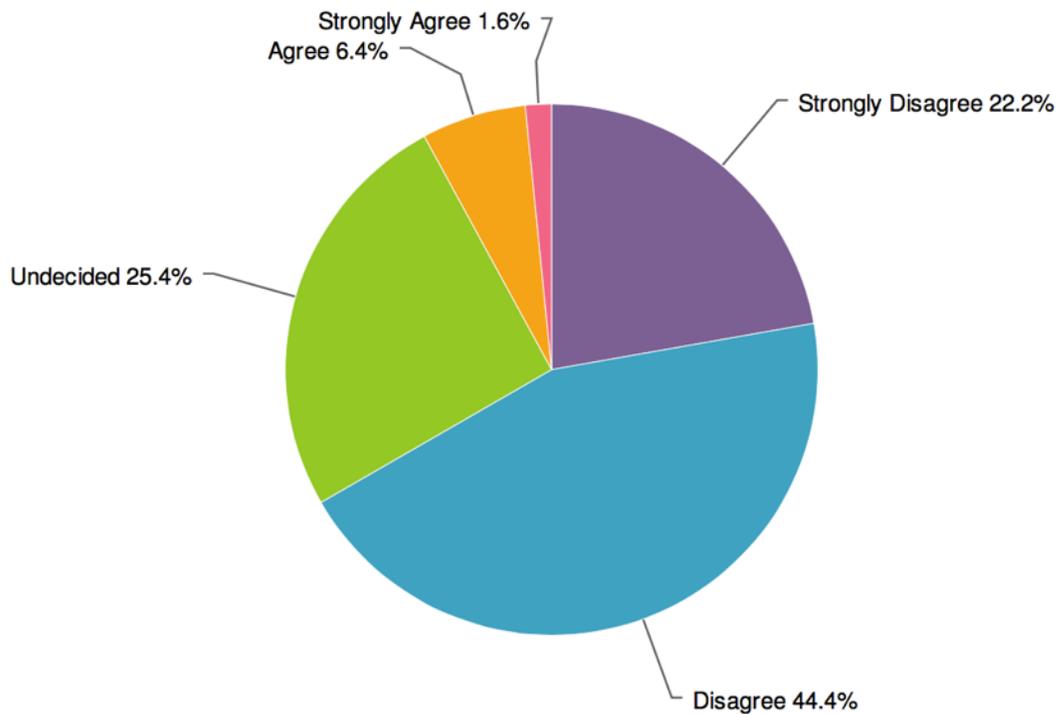
Discussion

The present study looked at how parents view the role that electronics play in their children's language, physical, and social-emotional development. The terms "technology" and "electronics" are operationally defined as devices with screens such as Smartphones, iPads, Kindles, Tablets, Computers, and Laptops. The definition does not include the television or educational technological devices such as the "Leapfrog." Overall, parent responses indicated that children's language, physical, and social-emotional development are not positively

influenced through the use of electronics. However, this may not mean that the use of these devices is having a direct negative effect on development either.

Past research has shown that electronics can inhibit language by reducing communication with the parent, which can in turn compromise parent-child interactions (Wooldridge & Shapka, 2012). The present study confirmed that children's communication is not positively influenced by electronics, and that they talk less when using them. Although past research has shown this can compromise future communicative interactions, it is important to consider the time spent using technology. About 95% of parents reported that their children do not spend more than three hours per day on electronics. Therefore, their communication may not be as greatly affected because this may be considered a relatively brief amount of time to spend on electronic devices. It is also important to take into consideration that the sample for this survey consisted of children that spend most of their days in daycare. They may have less time to spend on electronic devices between the time they get back home and go to bed, in comparison to other children who may not attend a daycare and spend the whole day at home with their parents.

Parents also reported that they felt their children used electronics for entertainment and pick up language from games that they play. Further information would be needed in order to determine the specific impact on language development. It would be important to know what type of language children are acquiring and if it is functional or not. Are they using the language that they are picking up from games to help them communicate? Or are they just repeating and scripting what they hear? This is a question that could benefit from further research, and could help us understand how children use language that they pick up from electronics.

The present study also confirmed that the use of electronics is not promoting physical activity as children are sedentary when using them. Parents have reported their children spend more time engaging in outdoor play than using electronics, but the sole use of electronics themselves are not promoting physical activity. However, past research has shown that an increased amount of screen time correlates to the likelihood of children being overweight (Maher et al., 2012).

According to parent responses, social-emotional development is also not promoted through the use of electronics. Parents report that it is difficult to take devices away from their children, and that they interact less with others while using them. However, previous research shows that when used appropriately, technology can be used to enhance children's social emotional development (Heft & Swaminathan, 2002). This suggests that parents can benefit from more information on how the use of electronics can positively influence social-emotional development. Children may be able to benefit socially from games that involve others through talking and interacting with a peer. For example, they can work together to solve a mystery on a computer game, or play on the same team in a video game. This is a crucial area of development, and one that can be positively influenced through the use of electronics.

There are some limitations to the present study. One limitation is that this research is solely based on parent reporting. The children's development was not assessed using any other measures. This is a limitation because self-reporting through a survey may not always be honest and true. Young children and the use of electronics can be a controversial topic, and some parents may not want to admit that their child spends hours a day on electronic devices, or they may fear they will look like a "bad parent" if they respond to a question in a certain way. The

generalizability is also a limitation because of the convenience sample used. Participants were

contacted from one childcare center, therefore these results cannot be used to generalize to the

rest of the population. Every participant in this study had at least two forms of electronic devices

in the household. Not everyone in the general population has access to electronics, therefore

parent perceptions of child development in these three areas may have differing results. Another

limitation to this study was the lack of direct access to the responses. Further statistical analysis

could more clearly define the results.

Despite these limitations, the study yields some important conclusions. Participant

responses show that based on parent perspective, electronics are not promoting their children's

language, physical, and social-emotional development. This does not mean that they are

necessarily negatively affecting their development either. So, what can be done to ensure that

children experience a healthy development while growing up in a world of technology? First, it

is important that both parents and childcare providers are educated on the recommended

guidelines for screen-time use and the ways electronics can help and hinder development. Also,

parents can download games on their devices that are both fun and educational for their children

so when they do use these devices, they are able to get something out of it that can help them

develop language skills. Parents may benefit from downloading apps that can help enhance their

child's language, like word searches or hangman. To address physical development, it is found

most effective to follow screen-time guidelines. However, parents or childcare providers can

encourage outdoor play or implement movement into screen-time through the use of interactive

and active games like the Wii or Pokemon Go, for example. The development of age-appropriate

games such as these can be used to promote physical activity. To help promote social-emotional

development, exposing children to games that encourage sharing or interacting with other peers can help them to develop social-skills in a fun and positive way.

This study is just a beginning and further research is needed to determine how to best educate parents and child-care providers about the benefits and risks to using technology with children. Further research could focus on how and where children spend their day, and how that affects their development in these areas. As previously mentioned, the children in this study all attended a daycare for most of the day. A study that included a greater population with varying socioeconomic status could yield different and informative results. This topic can be looked at through a wider lens, and more solutions can be made about how to understand and influence development in a wider range of children. This study could also benefit from follow-up interviews with parents that participated in the survey. Further insight could be gathered from the parents about their responses to the survey, and what they thought of the article that was provided after they participated. More research can also be done on how language that children pick up directly from games can influence their vocabulary and understanding of words. Another area of research that could be further looked into is how older children and teenagers are using electronics, and how they form habits when they are younger. Children are now growing up in a world that is run through the use of technology, and understanding the relationship between child development and electronics can help us to further educate parents and childcare providers on what can best benefit children's language, physical, and social-emotional development.

References

Armstrong, A., Donohue, C., & Highfield, K. (n.d.). Technology Integration: Defining What is Appropriate for Young Children [Abstract].

Bergen, D., Hutchinson, K., Nolan, J. T., & Weber, D. (2009). Effects of Infant-Parent Play With a Technology-Enhanced Toy: Affordance-Related Actions and Communicative Interactions. *Journal of Research in Childhood Education,* 24(1), 1-17. doi:10.1080/02568540903439342

Clements, R. (2004). An Investigation of the Status of Outdoor Play. *Contemporary Issues in Early Childhood Ciec, 5*(1), 68. doi:10.2304/ciec.2004.5.1.10

Freeman, N.K., & Somerindyke, J.(2000). Social play at the computer: Preschooler's scaffold and supper peers' computer competence. *Information Technology in Childhood Education,* 203-213

Heft, T. M., & Swaminathan, S. (2002). The Effects of Computers on the Social Behavior of Preschoolers. *Journal of Research in Childhood Education, 16*(2), 162-174. doi: 10.1080/02568540209594982

Laurson, K. R., Eisenmann, J. C., Welk, G. J., Wickel, E. E., Gentile, D. A., & Walsh, D. A. (2008). Combined Influence of Physical Activity and Screen Time Recommendations on Childhood Overweight. *The Journal of Pediatrics, 153*(2), 209-214. doi:10.1016/j.jpeds.2008.02.042

Maher, C., Olds, T. S., Eisenmann, J. C., & Dollman, J. (2012). Screen time is more strongly associated than physical activity with overweight and obesity in 9- to 16-year-old Australians. *Acta Paediatrica, 101*(11), 1170-1174. doi:10.1111/j.1651-2227.2012.02804.x

McLeod, S. (2008). Likert Scale. Retrieved from http://www.simplypsychology.org/likert-scale.html

Mcpake, J., Plowman, L., & Stephen, C. (2012). Pre-school children creating and communicating with digital technologies in the home. *Br J Educ Technol British Journal of Educational Technology, 44*(3), 421-431. doi:10.1111/j.1467-8535.2012.01323.x

Media and Children. (n.d.). Retrieved from https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/pages/media-and-children.aspx

Technology and Young Children -- Ages 3 through 8. (n.d.). Retrieved from http://oldweb.naeyc.org/about/positions/PSTECH98.asp

Sosa AV. Association of the Type of Toy Used During Play With the Quantity and Quality of Parent-Infant Communication. *JAMA Pediatrics.* 2016;170(2):132-137. doi:10.1001/ jamapediatrics.2015.3753.

Wethington, H., Pan, L., & Sherry, B. (2013). The Association of Screen Time, Television in the Bedroom, and Obesity Among School-Aged Youth: 2007 National Survey of Children's Health. *J School Health Journal of School Health, 83*(8), 573-581. doi:10.1111/josh.12067

Wooldridge, M. B., & Shapka, J. (2012). Playing with technology: Mother–toddler interaction scores lower during play with electronic toys. *Journal of Applied Developmental Psychology, 33*(5), 211-218. doi:10.1016/j.appdev.2012.05.005

Appendix A

<u>Survey</u>

Please answer the following demographic questions:

1. Age:

2. Gender identity?

    Male   Female   Other (please specify):

3. How many children do you have and what is their gender?

4. How old is/are your child/children?

5. Relationship to child/children?

6. Do you have electronic devices in the home?

7. If you answered yes to Question 6, what are the devices in your home?

8. Is/are your child/children allowed to use the electronics you have in the home?

    Yes   No

For the following items, please rate the extent to which you agree or disagree:

9. There should be rules to regulate the use of electronics at home.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

10. Electronic toys help my child be physically active.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

11. It is okay for children to use electronics before age three.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

12. My child does not interact with others when playing a game on an electronic device.

13. Electronic toys increase my child's communication during play.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

14. My child uses electronics more for entertainment than education.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

15. My child spends more than three hours per day on electronics.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

16. Electronics increase my child's motivation to learn.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

17. It is difficult to take away an electronic device from my child.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

18. I use electronics to encourage my child to read.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

19. My child prefers reading on screen than with printed material.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

20. My child engages in more outdoor play than using electronics inside.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

21. Each child can have their own smartphone/tablet before age eight.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

22. Supervising the use of electronics is important.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

23. My child interacts with me less when using electronics.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

24. My child talks more when using electronics.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

25. My child prefers using electronics than interacting with others.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

26. My child learns quicker from teachers/adults than from electronics.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

27. My child picks up language from games on electronics.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

28. The use of electronics is promoting my child's language development.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

29. The use of electronics is promoting my child's physical development.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

30. The use of electronics is helping my child's social-emotional development.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

Appendix B

<u>IRB Letter of Approval</u>

Date: 12/8/2016

Principal Investigator(s): Santina Marinelli

VIA EMAIL

IRB Proposal #: 2016-48   **Study Status:** Expedited

Proposal Title: The Increasing World of Technology and Toys: How they influence children's language, physical, and socio-emotional development

IRB Decision: APPROVED

Please be aware that this approval is only in force for one year from today or the proposed duration of the project, whichever is shorter. After that time, you will need to file a continuing review form to gain continued approval for your research. In the meantime, if there are any substantive changes to your research or any adverse events, please inform the IRB committee immediately. Any substantive changes to your research need to be approved by the IRB <u>before</u> they are implemented. The relevant sections of the Assumption College Guidelines for Review of Research Involving Human Subjects are included below for your convenience.

Procedure for changing an approved research project
To make substantive changes in an approved research project, the investigator should submit the revised plan with the requested changes highlighted, a revised informed consent form if needed, and a letter explaining the requested changes. The revision should be submitted in a signed paper copy and an electronic copy. Revised projects may usually be reviewed by expedited review. However, a full review may be required by the Board.

Reports of adverse events
Any adverse events involving human subjects in a research project must be reported to the IRB within 48 hours of the incident by the principal investigator or the faculty supervisor in the case

of a student project. Adverse events include all unanticipated (not mentioned in the consent form or application) occurrences of physical or psychological harm and unexpected threats to privacy (e.g., lost records) or safety of subjects. Minor adverse consequences should be reported only if they were either unanticipated in the consent form or if the original application substantially underestimated their probability or magnitude.

Upon receipt of an adverse event report, the IRB will decide if further investigation of the event is required. In some cases, investigators may be required to discontinue a study pending the outcome of the IRB review. Where required by other agencies, investigators must fulfill additional obligations to report adverse events to funding agencies or other institutions.

Please keep a copy of the Assumption College Guidelines for Review of Research Involving Human Subjects accessible for the duration of your project. If you have any questions, please feel free to contact me at irb @assumption.edu.

Good luck with this project.

All best,

Sarah R. Cavanagh, Ph.D.
Associate Professor of Psychology
Assumption College
Chair, IRB

Appendix C

<u>IRB Application</u>

APPLICATION TO: **Institutional Review Board, Assumption College**
FOR: **Approval of Research Involving Human Subjects**

Please complete all items on this face sheet, using "Not applicable" (N/A) when appropriate.

Application #_____   **Date:** _____
(to be assigned by IRB)

1. **Name and title of Principal Investigator(s):** Santina Marinelli

2. **Title of project:** The Increasing World of Technology and Toys: How they influence children's language, physical, and social-emotional development.

3. **Cooperating institutions other than Assumption College:** N/A

4. **Research subjects:** Parents with children ages 1-8 years old.

5. **Funding source** (proposed or actual): N/A

6. **Expected completion date:** May 2017.

7. **Suggested review category (exempt, expedited, full):** Expedited.

8. **Signature of Principal Investigator(s):** _____

9a. **Name of Faculty Supervisor:** Susan M. Scully-Hill
     (If a student project)

9b. **Signature of Faculty Supervisor:** _____
     (If a student project)

10. **Signature of Department Chair/Head:** _____

Application For Approval Of Research Involving Human Subjects: Study Protocol

11. General Statement of the problem:

    a. Purpose:

       With the development of, and increase in, technology in our society, child rearing practices are changing. There are a multitude of computer applications and electronics geared toward young children. Many of them claim they have the capacity to help children learn, grow and develop. The purpose of this study is to understand parents' perceptions about what is best practice related to technology when it comes to facilitating the growth and development of their children. This study will survey parents about three areas of their children's development and the use of technology: 1) language, 2) physical, and 3) social-emotional. The findings of this study may assist parents, future parents, and others who plan to work with children, to better understand the role technology plays in children's development.

*For the purpose of this study, "technology" and "electronics" are defined as devices with screens such as **Smartphones, iPads, Kindles, Tablets, Computers, and Laptops.** The definition of technology does not include the television or educational technological devices such as the "Leapfrog".

    b. Background:

       In the 21st century, we depend on technology for a multitude of reasons. It has become a vital part of our day-to-day lives, including the lives of growing children. It has become incorporated into how children are raised and how they develop. There are games and apps on iPads, smartphones, tablets, and computers that companies claim will help certain aspects of a child's development. There is research to suggest that screen time and electronic toys can both help and hinder children's development.

       As children are increasingly exposed to electronics at young ages, it can become habitual and part of their daily lives early on which may cause problems later in their development. According to the American Academy of Pediatrics, children are spending close to seven hours per day on electronics (American Academy of Pediatrics [AAP], "Media and Children," 2015). It is recommended by the AAP that screens and electronic devices for infants under two years of age should be avoided because their brains are developing quickly and they learn better at this age through interacting with people rather than screens. They also recommend that children do not spend more than one or two hours per day on electronics, and instead engage in imaginative and outdoor play, hobbies, and reading (AAP, "Media and Children," 2015). A survey done by Rhonda Clements in 2004 investigated how often children today in the USA participate in outdoor play in comparison to the generation of their mothers. Results from the survey show that 70 percent of mothers reported playing outside when they were children, while only 31

percent of their own children do. The survey also found that 78 percent of mothers reported playing imaginative games regularly while only 57 percent of children today play creative, or made-up games (Clements, 2004). It was concluded that there is a decrease in the amount and how often children today play outdoors, and reports from mothers show that electronics and computer games contribute to this lack of outdoor play (Clements, 2004). These findings along with the recommendations made by the AAP show how much technology has impacted children today, and the possible developmental issues that can occur.

Vital components of child's development are language and communication skills, and there are concerns that electronic devices and toys can hinder these important skills in children. They can affect the communication and language spoken between parents and children. Results from a study done by Michaela Wooldridge and Jennifer Shapka in 2012 suggest that children's language development may be effected by electronic toys by reducing communication with the parent (Wooldridge, Shapka 2012). This was concluded by conducting a study where play was observed between the mother and child in two sessions: one with electronic toys and one with traditional toys. There was less communication between the child and parent when they played with an electronic book. Certain features in electronic toys can inhibit the child and the parent to engage in make-believe and communicative play, and parent-child interactions can be compromised as a result (Wooldridge, Shapka 2012). This can be harmful to children's development because they are not speaking as much and not using verbal communication skills.

In agreement with the results from the Wooldridge study, a recent study published in February 2016 by Anna Sosa investigated how different toys (electronic, traditional, and books), affect the interactions and communication between infants and their parents. The results also showed that both the children and the parents spoke less during play with the electronic toys than with books (Sosa, 2016). She concluded that playing with electronic toys compared with books decreased the quality and quantity of language by the child and parent (Sosa, 2016). Sosa found that there were less content-specific words, parental responses, and conversational turns through play with the electronic toys. It was concluded that play with electronic toys rather than traditional toys should be discouraged in order to promote early language development in children (Sosa, 2016).

In contrast, although a lot of research suggests that electronic toys inhibit language and communication, a study done by Joanna McPake, Lydia Plowman, and Christine Stephen concluded the opposite. It investigated how the role of digital toys in children effect early communicative experiences. It concluded that technology like cell phones, computers, and electronic toys have potential to facilitate and expand children's communicative interactions (McPake et al., 2013). The children in this study already had greater exposure and developed knowledge to technologies by the time they started school, specifically in communicative experiences (McPake et al., 2013). This distinction in the literature shows that technology can also be useful in certain ways. It is possible that if age-appropriate toys are developed well, that it can enhance development in children (Wooldridge, Shapka, 2012).

Along with language and communication, physical development is also affected by technology and electronic toys in children. There is some recent literature on how physical activity and screen time affect physical development in children, and they all have similar conclusions. A study done by Carol Maher, Tim Olds, Joey Eisenmann, and James Dollman in 2012 investigated the relationship between screen time and physical activity on the risk of being overweight. It was concluded that the likelihood of being overweight was increased by the amount of screen time rather than the amount of physical activity, and these results were more consistent in boys rather than girls (Maher et al., 2012). Maher et al. also found that following the recommended screen time guidelines would be more effective than following physical activity guidelines in decreasing the likelihood of being overweight. A study from 2012 by Holly Wethington, Liping Pan, and Bettylou Sherry also investigated the effects of excessive screen time in school-aged youth. Wethington et al. concluded that more than one fifth of children are at an increased risk of obesity because of the excessive use of screen time and televisions in their bedrooms, and that there is a challenge in public health to increase awareness about these effects. Social-emotional development is also an important part of a child's development.

Armstrong et al. explains ways to enhance social-emotional development using technology, like having children work together to make a video or learn about people in other places. It can help develop their social skills rather than hinder them. One study done by Todd Heft and Sudha Swaminathan in 2002 investigated how computers impacted the social behavior of preschoolers. They observed children using developmentally appropriate computer software for two months, and analyzed the interactions between the children, the teachers and children, and any conflicts that arose (Heft, Swaminathan, 2002). There were mixed positive and negative results after this study. Heft et al. found that if a child spoke to another on the computer, sometimes they would be ignored. However, some of the children were cooperative and wanted to share the computer with each other, while conflicts arose when the children did not want to share (Heft, Swaminathan, 2002). Heft et al. concluded that although the children in this study did use the computer individually, they can still provide a good social environment when used appropriately. A similar study made the same observation that the children interacted with each other even though they were meant to use the computer alone (Freeman, Somerindyke, 2001). These studies give the implication that technology can be used to enhance children's social-emotional development when used appropriately.

Description of overall research plan and methodology:

The primary research question that this study attempts to answer is "how do parents view the role of electronics and technology in their child's language, physical, and social-emotional development". In order to answer this question, parents of children ages 1-8 years old will be surveyed. The survey instrument (see attached) is comprised of questions that are designed to collect information from parents based on their use of electronics and technology to assist in their child's language, physical, and social-emotional development. The survey attempts to collect information on parents' perceptions of their child's use of electronics and technology, and

how it affects these three areas of development. The survey consists of 29 statements that parents rate using a 5-point Likert scale, in which the responses to the questions will indicate the degree to which the participant agrees or disagrees with a statement (McLeod, 2008). For example:

Electronic toys help my child be physically active.

| Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |

It is okay for children to use electronics before age three.

| Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |

My child does not interact well with others when playing a game on an electronic device.

| Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |

Electronic toys increase my child's communication during play.

| Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |

Description of subjects:

The study will utilize a convenience sample of participants who are parents of children ages 1-8 years old. A list of child development centers in the area will be developed and contact will be made to center directors to gain permission to administer the surveys to volunteers. Center personnel will request volunteers to participate, and the informed consent will be embedded in the link to the survey. Participants will have to read and accept the informed consent before continuing with the survey. No incentives will be provided to subjects for their participation. Subjects will have the option to obtain the results of the study if they wish.

 The instrument will be administered through "Survey Gizmo" and will take approximately 20 minutes for parents to complete. It is anticipated that 100 surveys will be distributed (sent via email to parents who volunteer) with the goal of receiving at least 30 responses for a 30% response rate. The survey responses will be kept confidential as no participant names will be recorded on the actual survey. Individual participant responses will only be used for the purposes

of this study. Participant names will not be revealed. The individual participant surveys will not be printed out and will be password protected with only the "Survey Gizmo" administrator (Mr. Robert Bureau, Director of Distance Education for Graduate Studies at Assumption College) holding the password.

12. Outline of potential benefit of this project:

There may be no direct benefit to the participants. However, the results of the study may further knowledge about how parents perceive the impacts of technology and screen time on their children's language, physical, and social-emotional development. Learning about how parents understand what is best for their children can help determine the need for future research in this area. Results may also provide information about what might be helpful to parents in educating them about the impact of electronics and technology on their children's growth and development. Participants may find that thinking about the effective use of technology and electronics while completing the survey instrument helpful. Participants will have the option to receive results of the study if they wish. After parents complete the survey, there will be a link to two articles outlining the effective use and potential harms to the use of technology with children (attached).

Outline potential risks to subjects:

There are no inherent psychological, physical, social, or legal risks in the procedures for this study. It is not anticipated that participants will experience risks when completing the survey instrument. Participants will not be exposed to any more risk of harm or discomfort than those ordinarily encountered in daily life. Occasionally a participant may experience mild stress by completing the survey and thinking about their child's growth and development but if this is the case, participants may discontinue completing the surveys at any time.

14. Explain the manner in which you will obtain informed consent:

The informed consent will be embedded in the link to the survey that the participants will receive. Once they read and agree to the informed consent, they will be able to continue with the survey. Participants will be informed that in signing the form, they agree to voluntary participation in this study, and they are free to withdraw at any time.

15. Explain eligibility for expedited review (if appropriate):

Expedited review is appropriate as this study poses minimal risk to human subjects and uses a survey instrument to collect information on individual behavior and perception.

Appendix D

<u>Informed Consent</u>

With the development of, and increase in, technology in society, it is changing how some raise children. There are a multitude of applications and electronics geared toward young children that claim they will help children learn and develop in a number of areas. The purpose of this study is to understand parents' perceptions about what is best for their children's development and learning. This study will address three areas of development: 1) language, 2) physical, and 3) social-emotional. The findings of this study may aid current or future parents, and others who plan to work with children to understand the role technology plays in children's development.

*For the purpose of this study, "technology" and "electronics" are defined as devices with screens such as **Smartphones, iPads, Kindles, Tablets, Computers, and Laptops.** The definition of technology does not include the television or educational technological devices such as the Leapfrog.

CONSENT TO PARTICIPATE IN RESEARCH PROJECT ENTITLED: A Child's World: How Electronics Influence Children's Language, Physical, and Social-Emotional Development

Principal Investigator(s): Santina Marinelli

You are invited to take part in a research study examining the role that technology plays in children's language, physical, and social-emotional development. You have been asked to be in this study because we are particularly interested in how parents view technology and its impacts on children ages birth to eight in these three developmental areas.

<u>Procedures</u>: If you choose to participate in the study, you will be asked to complete one questionnaire. The survey consists of questions about the degree to which technology and screen time help or hinder children in three areas of development: language, physical, and social-emotional. The survey should take approximately 20 minutes to complete.

<u>Benefits</u>: There may be no direct benefit to you in completing the survey. However, the results of the study may further knowledge about how you perceive the impacts of technology and screen time on children's language, physical, and social-emotional development. Learning about how parents understand what is best for their children can help determine the need for future research in this area. Results may also provide information about what might be helpful to you when thinking about the impact of electronics and technology on your child's growth and development. You may also find that thinking about the effective use of technology and electronics while completing the survey instrument helpful. You will have the option to receive results of the study if you wish and further information can be provided to you regarding the effective use of electronics and technology for children's development.

Potential Risks: There are no inherent psychological, physical, social, or legal risks in the procedures for this study. It is not anticipated that you will experience risks when completing the survey instrument. By completing the survey, you will not be exposed to any more risk of harm or discomfort than those ordinarily encountered in daily life. Occasionally a participant may experience mild stress by completing the survey and thinking about their child's growth and development but if this is the case, you may discontinue completing the surveys at any time.

Confidentiality: The information from the surveys will be used for research purposes only. Your responses will be identified by a number and the identity of any participant will be kept confidential. The survey instrument will not ask for your name. In addition, your name will not be used in any reports or publications of this study and only aggregated findings will be shared in presentations and publications on this research. Individual participant surveys will not be printed out and will be password protected with only the "Survey Gizmo" administrator having access to the password.

Freedom of Choice to Participate: You are free (1) to decide whether or not to participate, and free (2) to withdraw from the study at any time, and (3) to skip any questions you do not wish to answer. A decision not to participate, or to skip any questions, will not adversely affect any interactions with the investigator or any representative/employee of Assumption College.

Questions: Before you sign this form, please ask any questions on any part of this study that is unclear to you. You may take as much time as necessary to think this over. At any point in the study, you may question the Principal Investigator or faculty advisor about the study (Santina Marinelli; santina.marinelli@assumption.edu, Susan Scully-Hill; sscully@assumption.edu). In addition, you are free to contact the Institutional Review Board Chair (Sarah Cavanagh; scavanagh) about any concerns.

Consent: This project has been explained to me to my satisfaction and in language I can understand, and I have received a copy of this consent form. I understand what my participation will involve and I agree to take part in this project under the terms of this agreement. I understand that I am not giving up my legal rights by signing this form. I also certify that I am 18 years of age or older.

Your Name: *_____

Digital Signature of Participant: (type your name) * _____

Today's Date: * _____

Appendix E

NAEYC Position Statement

Technology and Young Children -- Ages 3 through 8

In this position statement, we use the word technology to refer primarily to computer technology, but this can be extended to include related technologies, such as telecommunications and multimedia, which are becoming integrated with computer technology.
Technology plays a significant role in all aspects of American life today, and this role will only increase in the future. The potential benefits of technology for young children's learning and development are well documented (Wright & Shade 1994). As technology becomes easier to use and early childhood software proliferates, young children's use of technology becomes more widespread. Therefore, early childhood educators have a responsibility to critically examine the impact of technology on children and be prepared to use technology to benefit children.
Market researchers tracking software trends have identified that the largest software growth recently has been in new titles and companies serving the early childhood educational market. Of the people who own home computers and have young children, 70% have purchased educational software for their children to use (SPA Consumer Market Report 1996). While many new titles are good contributions to the field, an even larger number are not (Haugland & Shade 1994). Early childhood educators must take responsibility to influence events that are transforming the daily lives of children and families. This statement addresses several issues related to technology's use with young children: (1) the essential role of the teacher in evaluating appropriate uses of technology; (2) the potential benefits of appropriate use of technology in early childhood programs; (3) the integration of technology into the typical learning environment; (4) equitable access to technology, including children with special needs; (5) stereotyping and violence in software; (6) the role of teachers and parents as advocates; and (7) the implications of technology for professional development.

NAEYC's Position
Although now there is considerable research that points to the positive effects of technology on children's learning and development (Clements 1994), the research indicates that, in practice, computers supplement and do not replace highly valued early childhood activities and materials, such as art, blocks, sand, water, books, exploration with writing materials, and dramatic play. Research indicates that computers can be used in developmentally appropriate ways beneficial to children and also can be misused, just as any tool can (Shade & Watson 1990). Developmentally appropriate software offers opportunities for collaborative play, learning, and creation. Educators must use professional judgment in evaluating and using this learning tool appropriately, applying the same criteria they would to any other learning tool or experience. They must also weigh the costs of technology with the costs of other learning materials and program resources to arrive at an appropriate balance for their classrooms.

1   In evaluating the appropriate use of technology, NAEYC applies principles of developmentally appropriate practice (Bredekamp 1987) and appropriate curriculum and

assessment (NAEYC & NAECS/SDE 1992). In short, NAEYC believes that in any given situation, a professional judgment by the teacher is required to determine if a specific use of technology is age appropriate, individually appropriate, and culturally appropriate. The teacher's role is critical in making certain that good decisions are made about which technology to use and in supporting children in their use of technology to ensure that potential benefits are achieved. Teachers must take time to evaluate and choose software in light of principles of development and learning and must carefully observe children using the software to identify both opportunities and problems and make appropriate adaptations. Choosing appropriate software is similar to choosing appropriate books for the classroom -- teachers constantly make judgments about what is age appropriate, individually appropriate, and culturally appropriate. Teachers should look for ways to use computers to support the development and learning that occur in other parts of the classroom and the development and learning that happen with computers in complement with activities off the computer. Good teaching practices must always be the guiding goal when selecting and using new technologies.

2   Used appropriately, technology can enhance children's cognitive and social abilities. Computers are intrinsically compelling for young children. The sounds and graphics gain children's attention. Increasingly, young children observe adults and older children working on computers, and they want to do it, too. Children get interested because they can make things happen with computers. Developmentally appropriate software engages children in creative play, mastery learning, problem solving, and conversation. The children control the pacing and the action. They can repeat a process or activity as often as they like and experiment with variations. They can collaborate in making decisions and share their discoveries and creations (Haugland & Shade 1990).

Well-designed early childhood software grows in dimension with the child, enabling her to find new challenges as she becomes more proficient. Appropriate visual and verbal prompts designed in the software expand play themes and opportunities while leaving the child in control. Vast collections of images, sounds, and information of all kinds are placed at the child's disposal. Software can be made age appropriate even for children as young as three or four.

When used appropriately, technology can support and extend traditional materials in valuable ways. Research points to the positive effects of technology in children's learning and development, both cognitive and social (Clements 1994; Haugland & Shade 1994).

In addition to actually developing children's abilities, technology provides an opportunity for assessment. Observing the child at the computer offers teachers a "window" onto a child's thinking. Just as parents continue to read to children who can read themselves, parents and teachers should both participate with children in computer activities and encourage children to use computers on their own and with peers.

Research demonstrates that when working with a computer children prefer working with one or two partners over working alone (Lipinski et al. 1986; Rhee & Chavnagri 1991; Clements, Nastasi, & Swaminathan 1993). They seek help from one another and seem to prefer help from peers over help from the teacher (King & Alloway 1992; Nastasi & Clements 1993). Children engage in high levels of spoken communication and

cooperation at the computer. They initiate interactions more frequently and in different ways than when engaged with traditional activities, such as puzzles or blocks. They engage in more turn taking at the computer and simultaneously show high levels of language and cooperative-play activity.

Technology extends benefits of collaboration beyond the immediate classroom environment for children in the primary grades who can already read and write. With the potential of access to the Internet or other on-line "user friendly" networks, young children can collaborate with children in other classrooms, cities, counties, states, and even countries. Through electronic field trips in real time or via diskette, children are able to share different cultural and environmental experiences. Electronic mail and telecommunications opportunities through the Internet facilitate direct communication and promote social interactions previously limited by the physical location of participating learners.

3   Appropriate technology is integrated into the regular learning environment and used as one of many options to support children's learning. Every classroom has its own guiding philosophies, values, schedules, themes, and activities. As part of the teacher's overall classroom plan, computers should be used in ways that support these existing classroom educational directions rather than distort or replace them. Computers should be integrated into early childhood practice physically, functionally, and philosophically. Teachers can accommodate integration in at least five ways:

  ◦   Locate computers in the classroom, rather than in a separate computer lab (Davis & Shade 1994).
  ◦   Integrate technology into the daily routine of classroom activity. For example, a teacher might introduce musical rhythm with actions, recordings, and a computer used as an electronic rhythm-matching game. The children then would work in small groups with the computer program serving as one of several learning centers.
  ◦   Choose software to enrich curriculum content, other classroom activities, or concepts. For example, the program in the computer learning center might allow children to invent their own rhythms that they could simultaneously hear played back and see displayed graphically. They could edit these rhythms on the computer, hearing and seeing the changes.
  ◦   Use technology to integrate curriculum across subject-matter areas. For example, one group of children used the computer to make signs for a restaurant in their dramatic-play area (Apple Computer Inc. 1993). The rhythm program helps children connect mathematical patterns to musical patterns.
  ◦   Extend the curriculum, with technology offering new avenues and perspectives. For example, exploring shapes on the computer provides opportunities to stretch, shrink, bend, and combine shapes into new forms. Such activities enrich and extend children's activities with physical manipulatives.

4
5   Early childhood educators should promote equitable access to technology for all children and their families. Children with special needs should have increased access when this is

helpful. Educators using technology need to be especially sensitive to issues of equity. A decade of research on the educational use of computers in schools reveals that computers maintain and exaggerate inequalities (Sutton 1991). Sutton found gender, race, and social-class inequalities in the educational uses of computers, which Thouvenelle, Borunda, and McDowell summarize below.

- Girls used computers in and out of school less often than did boys.
- African American students had less access to computers than did White students.
- Presence of computers in a school did not ensure access.
- Teachers, while concerned about equity, held attitudes that hindered access -- they believed that better behaved students deserved more computer time and that the primary benefit of computers for low-achieving students was mastery of basic skills (i.e., drill-and-practice software).
- Richer schools bought more equipment and more expensive equipment. (1994, 153-54)

6. These findings identify trends that, unchecked, will almost certainly lead to increased inequity in the future. Early childhood educators must find ways to incorporate technology into their classrooms that preserve equity of access and minimize or even reverse the current trends. For example, anecdotal reports indicate that preschool-age boys and girls show equal interest in computers, but as they grow older girls begin to spend less time with computers than do boys. There are a number of ways educators can proactively work to maintain girls' interest in computers and technology: (1) consider girls' interests and interaction styles when selecting and evaluating software for classroom use; (2) model the use of the computer as a learning and productivity tool and invite children, especially girls, to observe and assist them in the work; and (3) promote equity by offering special times for "girls only" use of computers, which permits girls to explore the computer without having to directly compete with boys (Thouvenelle, Borunda, & McDowell 1994).

Considerations of equity in curriculum content require qualitative judgments. For example, research evidence indicates that children who are economically disadvantaged have less access to computers at home and at-home access is related to attitudes and competence (Martinez & Mead 1988). If schools wish to provide equity to children of low-income families, with respect to their confidence and competence concerning computer learning, these children need to be provided more in-school computer access (Sutton 1991). And that access must be meaningful, moving beyond rote drill-and-practice usage.

Preschool-age children spend time in a variety of diverse settings (e.g., homes, child care centers, family child care), which further complicates the issues of equity and access. Some of these settings have considerable access to technology while others lack the very basics. The more early childhood educators believe in the benefits of appropriate use of technology at the preschool age, the more responsibility we bear in ensuring equity and access to this important learning tool.

Efforts should be made to ensure access to appropriate technology for children with special needs, for whom assistive technologies may be essential for successful inclusion.

For children with special needs, technology has many potential benefits. Technology can be a powerful compensatory tool -- it can augment sensory input or reduce distractions; it can provide support for cognitive processing or enhance memory and recall; it can serve as a personal "on-demand" tutor and as an enabling device that supports independent functioning.

The variety of assistive-technology products ranges from low-tech toys with simple switches to expansive high-tech systems capable of managing complex environments. These technologies empower young children, increasing their independence and supporting their inclusion in classes with their peers. With adapted materials, young children with disabilities no longer have to be excluded from activities. Using appropriately designed and supported computer applications, the ability to learn, move, communicate, and recreate are within the reach of all learners.

Yet, with all these enhanced capabilities, this technology requires thoughtful integration into the early childhood curriculum, or it may fall far short of its promise. Educators must match the technology to each child's unique special needs, learning styles, and individual preferences.

7   The power of technology to influence children's learning and development requires that attention be paid to eliminating stereotyping of any group and eliminating exposure to violence, especially as a problem-solving strategy. Technology can be used to affirm children's diversity.

Early childhood educators must devote extra effort to ensure that the software in classrooms reflects and affirms children's diverse cultures, languages, and ethnic heritages. Like all educational materials, software should reflect the world children live in: it should come in multiple languages, reflect gender equity, contain people of color and of differing ages and abilities, and portray diverse families and experiences (Derman-Sparks & A.B.C. Task Force 1989; Haugland & Shade 1994).

Teachers should actively select software that promotes positive social values. Just like movies and television today, children's software is often violent and much of it explicit and brutally graphic, as in most of the best-selling titles for the popular game machines. But, often, violence is presented in ways that are less obvious. In all of its forms, violence in software threatens young children's development and challenges early childhood educators, who must take active steps to keep it out of their classrooms (see the NAEYC Position Statement on Violence in the Lives of Children 1994).

Some software programs offer children the opportunity to get rid of mistakes by "blowing up" their creations -- complete with sound effects -- instead of simply erasing or starting over. As a metaphor for solving problems or getting rid of mistakes, "blowing up" is problematic. In the context of a computer software experience, it is more troubling than in the context of television or video. Children control the computer software, and, instead of being passive viewers of what appears on the screen, with the computer they become active decisionmakers about what takes place on the screen. Software programs that empower children to freely blow up or destroy without thought of the actual consequences of their actions can further the disconnection between personal responsibility and violent outcomes.

Identifying and eliminating software containing violence is only one of the challenges facing early childhood educators. A related, opposite challenge is discovering software programs that promote positive social actions. For example, software has the potential to offer children opportunities to develop sensitivities to children from other cultures or to children with disabilities. Much could be done to help children develop positive responses to cultural and racial diversity by offering software programs that enable children to explore the richness within their own and different cultures.

8   Teachers, in collaboration with parents, should advocate for more appropriate technology applications for all children. The appropriate and beneficial use of technology with young children is ultimately the responsibility of the early childhood educator, working in collaboration with parents. Parents and teachers together need to make better choices as consumers. As they become educated on the appropriate uses of technology, parents and teachers are more likely to make informed decisions and to make it known to developers of technology when they are unhappy with products. Working together, parents and teachers are a large consumer group wielding greater influence on the development of technology for young children. Following are specific recommendations for early childhood professionals as they advocate for more appropriate technology applications for all children.

- ◦ Provide information to parents on the benefits and use of appropriate software.
- ◦ Advocate for computer hardware that can be upgraded easily as new technology becomes available.
- ◦ Encourage software publishers to make previewing of software easier for parents and educators.
- ◦ Advocate for a system of software review by educators.
- ◦ Promote the development of software and technology applications that routinely incorporate features that cater to the needs of learners with different abilities.
- ◦ Advocate for software that promotes positive representation of gender, cultural and linguistic diversity, and abilities. Software publishers should create a balance of programs that appeal to both boys and girls.
- ◦ Encourage software publishers to create programs that support collaboration among learners rather than competition. Fostering cooperative learning enhances the acceptance of the abilities of all learners.
- ◦ Encourage software publishers to develop programs that reflect appropriate, nonviolent ways to solve problems and correct mistakes.
- ◦ Develop formal and informal information sharing and support for teachers, parents, and appropriate organizations and community-based programs. Encourage free community access to technology through libraries, schools, and so forth.
- ◦ Support policies on federal, state, and local levels that encourage funding that supports equity in access to technology for young children and their families.

9

10   The appropriate use of technology has many implications for early childhood professional development. As early childhood educators become active participants in a

technological world, they need in-depth training and ongoing support to be adequately prepared to make decisions about technology and to support its effective use in learning environments for children.

To achieve the potential benefits of technology, both preservice and inservice training must provide early childhood educators with opportunities for basic information and awareness. These efforts must address the rapid proliferation and fast-paced change within the technology arena. Opportunities that emphasize evaluating the software in relation to children's development are essential.

Institutions of higher education and other organizations and groups that provide preservice and inservice education have a responsibility to

- incorporate experiences that permit educators to reflect on the principles of early childhood education and how technology can support and extend these principles;
- give teachers concentrated time to focus on how best to use educational technology and to develop a plan for the use of educational technology in a school or early childhood program;
- provide hands-on training with appropriate software programs to assist teachers in becoming familiar and comfortable with the operation and features of hardware and software; and
- provide on-site and school-based training on effectively integrating technology into the curriculum and assessment process.

11   At the classroom level, teachers need staff-development experiences (Kearsley & Lynch 1992) that permit them to

- use teaching techniques that fully use the technology;
- encourage parental involvement with technology;
- match technology applications to the learning needs of individual children;
- look for cross-curriculum/cross-cultural applications;
- facilitate cooperative interactions among children; and
- use technology to improve personal efficiency.

12   The potentials of technology are far-reaching and ever changing. The risk is for adults to become complacent, assuming that their current knowledge or experience is adequate. "Technology is an area of the curriculum, as well as a tool for learning, in which teachers must demonstrate their own capacity for learning" (Bredekamp & Rosegrant 1994, 61). As teachers try out their new knowledge in the classroom, there should be opportunities to share experiences and insights, problems and challenges with other educators. When teachers become comfortable and confident with the new technology, they can be offered additional challenges and stimulated to reach new levels of competence in using technology.

Early childhood educators should use technology as a tool for communication and collaboration among professionals as well as a tool for teaching children.

Technology can be a powerful tool for professional development. Software can provide accessible information and tools for classroom management, planning, and creation of materials. Telecommunications and the Internet can enable teachers to obtain information and new ideas from around the world and to interact with distant experts and peers. Early

childhood educators can incorporate principles of cooperative learning as they assist distant peers in acquiring new skills; share curriculum ideas, resources, and promising practices; exchange advice; and collaborate on classroom and professional development projects. Providing training and support for access to services available via on-line networks and the Internet has the potential of opening the doors to worlds of additional classroom resources. With a responsive on-line system, mentors can assist novices in becoming more technology literate and more involved in actively using technology for professional benefits. As educators become competent users of technology for personal and professional growth, they can model appropriate use for young children.

<div align="center">References</div>

Apple Computer Inc. 1993. The adventure begins: Preschool and technology. Videocassette. (Available from NAEYC.)

Bredekamp, S., ed. 1987. Developmentally appropriate practice in early childhood programs serving children from birth through age 8. Exp. ed. Washington, DC: NAEYC.

Bredekamp, S., & T. Rosegrant. 1994. Learning and teaching with technology. In Young children: Active learners in a technological age, eds. J.L. Wright & D.D. Shade, 53-61. Washington, DC: NAEYC.

Clements, D.H. 1994. The uniqueness of the computer as a learning tool: Insights from research and practice. In Young children: Active learners in a technological age, eds. J.L. Wright & D.D. Shade, 31-50. Washington, DC: NAEYC.

Clements, D.H., B.K. Nastasi, & S. Swaminathan. 1993. Young children and computers: Crossroads and directions from research. Young Children 48 (2): 56-64.

Davis, B.C., & D.D. Shade. 1994. Integrate, don't isolate! -- Computers in the early childhood curriculum. ERIC Digest (December). No. EDO-PS-94-17.

Derman-Sparks, L., & the A.B.C. Task Force. 1989. Anti-bias curriculum: Tools for empowering young children. Washington, DC: NAEYC.

Haugland, S.W., & D.D. Shade. 1990. Developmental evaluations of software for young children: 1990 edition. New York: Delmar.

Haugland, S.W., & D.D. Shade. 1994. Software evaluation for young children. In Young children: Active learners in a technological age, eds. J.L. Wright & D.D. Shade, 63-76. Washington, DC: NAEYC.

Kearsley, G., & W. Lynch. 1992. Educational leadership in the age of technology: The new skills. Journal of Research on Computing in Education 25 (1): 50-60.

King, J.A., & N. Alloway. 1992. Preschooler's use of microcomputers and input devices. Journal of Educational Computing Research 8: 451-68.

Lipinski, J.A., R.E. Nida, D.D. Shade, & J.A. Watson. 1986. The effect of microcomputers on young children: An examination of free-play choices, sex differences, and social interactions. Journal of Educational Computing Research 2 (2): 147-68.

Martinez, M.E., & N.A. Mead. 1988. Computer competence: The first national assessment. Tech report no. 17-CC-01. Princeton, NJ: National Educational Progress and Educational Testing Service.

NAEYC position statement on violence in the lives of children. 1994. Washington, DC: NAEYC.

NAEYC, & NAECS/SDE (National Association of Early Childhood Specialists in State Departments of Education). 1992. Guidelines for appropriate curriculum content and assessment in programs serving children ages 3 through 8. In Reaching potentials: Appropriate curriculum and assessment for young children, volume 1, eds. S. Bredekamp & T. Rosegrant, 9-27. Washington, DC: NAEYC.

Nastasi, B.K., & D.H. Clements. 1993. Motivational and social outcomes of cooperative education environments. Journal of Computing in Childhood Education 4 (1): 15-43.

Rhee, M.C., & N. Chavnagri. 1991. 4 year old children's peer interactions when playing with a computer. ERIC, ED 342466.

Shade, D.D., & J.A. Watson. 1990. Computers in early education: Issues put to rest, theoretical links to sound practice, and the potential contribution of microworlds. Journal of Educational Computing Research 6 (4): 375-92.

SPA consumer market report. 1996. Washington, DC: Software Publishers Association (SPA).

Sutton, R.E. 1991. Equity and computers in the schools: A decade of research. Review of Educational Research 61 (4): 475-503.

Thouvenelle, S., M. Borunda, & C. McDowell. 1994. Replicating inequities: Are we doing it again? In Young children: Active learners in a technological age, eds. J.L. Wright & D.D. Shade, 151-66. Washington, DC: NAEYC.

Wright, J.L., & D.D. Shade, eds. 1994. Young children: Active learners in a technological age. Washington, DC: NAEYC.