Facilitation or Herding Cats?

Excessive Media Use and Elementary Education

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Introduction

As digital device technology improves, so do the popularity and sales of digital media delivery products. With increased digital media delivery devices in households, the media consumption has also increased. According to Rideout (2015) a typical day of media use for an 8-10 year old is about 5 and a half hours, consuming almost 8 hours of media exposure through digital device multitasking (p. 37). Several studies have shown non-causal correlations between media use and possible long-term adverse effects on human physiology. Fewer studies have been conducted into the effects of media use on the academic performance of the developing child. A child enters the school system as early as 4 years old. According to Wardle (2009) “during the first 10 years (but especially the first five years of life) the brain is undergoing a great deal of growth in synaptic connections and pruning,” (p. 282). Electronic learning and academic media technologies add to the increase of digital media use and often mimic the entertainment media outside of the classroom, such as interactive games or watching videos. This research proposes a relationship between following recommended media use, and elementary school student academic performance.

Maslow’s Hierarchy of Needs theory of the Physiological (breathing, food, water, sex, sleep, excretion) will be referenced for meeting the fundamental requirements for learning and academic achievement; but also as underlying needs for a healthy, functioning human body. Vygotsky’s theory of will be referenced for the understanding of facilitation and scaffolding in child education. Piaget’s 4 stages of cognitive development will be referenced for the psychological stages and which milestones take place in the developing mind of a child.
This study will be an embedded sequential mixed methods approach with a pragmatic world view, and collection of both quantitative and qualitative data sequentially in the design. The expected outcomes are in line with Creswell (2014) to form “an understanding of participant views within the context of an experimental intervention” (p. 231).

Online research of existing child education databases, and case studies will be collected and referenced in relation to digital media use and academic learning. Researched information will be used for creating open-ended questionnaires and educational materials about digital media use recommendations. Online database research will be performed on Northern Virginia schools to determine four elementary schools for the location of the study. Special education teachers in 3rd through 5th grades will be selected to participate in monitoring student media use and academic progress towards completing Standards of Learning (SOL) testing requirements and provide final scores. Special education teachers will complete an open-ended questionnaire about recommended use of digital media. Students with special needs will provide Body Mass Index (BMI) test results at the beginning and end of the study. Only two schools will be provided educational materials about digital media use recommendations for special education teachers, parents and students. At those same two schools, parents of the special education students will voluntarily complete a questionnaire, attend a quarterly interview as established in the student Individualized Education Program (IEP), and maintain a weekly family media use plan with their child for educational and tracking purposes. Lastly, all the research will be combined to provide better understanding of media use related to academic outcomes, as a result from providing education to parents, children and special education teachers about following media use recommendations.
This embedded sequential mixed methods study will address physiological effects and education of recommended media use and its effects on childhood elementary learning. According to Creswell (2014) the embedded sequential mixed methods design is optimal “within the health sciences and when investigators test an intervention or program in an applied setting (e.g., in a school)” (p. 228). The embedded sequential mixed methods design is a type of design in which quantitative and qualitative data are collected sequentially (before, during and after the experiment), analyzed, and merged to create instruments and measures for participant study. Creswell (2014) states, the embedded mixed methods design is “chosen to understand experimental results by incorporating perspectives of individuals” (p. 231).

Data references to the effects of media use duration with television, computer, mobile and gaming technology devices will be used to test Maslow’s Hierarchy of Needs theory of the Physiological that predicts environmental influences which negatively influence physiological factors will negatively influence elementary childhood learning and associated academic measures.

The open-ended questionnaires, interviews, and case studies from students, parents, and special education professionals will gather measurable data about participants and explore the effects of media use durations on academic measures for 3rd through 5th grade elementary students.

The reason for collecting both quantitative and qualitative data is to provide a broad range of statistical evidence and distinctive participant accounts surrounding the topic of digital media use experienced by elementary school students.
Research Questions

Does Maslow’s Hierarchy of Needs theory of the Physiological (air, food, water, sleep) explain the relationship between recommended digital media use and academic performance as measured in SOL test scores, controlling for the effects of 3rd – 5th grade students with special educational needs?

How do students, parents and special education teachers describe their perspectives and experiences with balancing digital media use recommendations (any digital device providing content) with childhood academic performance?

How does the qualitative interview data on media use and academic performance further explain why, recommended media use, as measured quantitatively, tends to encourage academic performance as measured in SOL test scores of 3rd – 5th grade students with special educational needs?

Literature Review

Key Terms

Screen time is often “defined as time spent watching TV or videos, playing computer games, or using a computer” (Fakhouri, T. H., Hughes, J. P., Brody, D. J., Kit, B. K., & Ogden, C. L., 2013, p.224). However, for the purposes of this study the term refers to any media use which involves a digital view screen. ST may involve either traditional media such as TV or reading, or interactive media use such as computers, tablets, cell phones, etc.
Physiological needs refer to Maslow’s physiological needs and are “The needs that are usually taken as the starting point for motivation theory are the so called physiological drives” (Maslow, A. H., 1943 p.372).

**Theoretical Framework**

The prospective longitudinal study by Pagani, Fitzpatrick, Barnett, and Dubow (2010) attempted to estimate the influence of early childhood television on fourth grade academic, psychosocial, and lifestyle characteristics. A total of 1,314 children were analyzed from the Quebec Longitudinal Study of Child Development at 29 and 53 months of age for parent reported both week and weekend hours of television exposure. A follow up took place when the children were in the fourth grade at 10 years of age. The fourth grade teachers provided data related to academics and psychosocial issues via rating a Likert scale. Parents provided data on health behaviors like sedentary activity, diet and BMI. Significant findings from the study concluded there were long-term risks associated with early media exposure. While the majority of children followed the recommended guidelines, 11% at 29 months and 23.4% at 53 months exceeded the viewing recommendation. Children with educated mothers and experienced less television exposure over the two reporting periods, while at 29 months children of single parent family’s experienced more exposure. For academics, it was determined each additional hour of early childhood viewing related to a 7% drop in classroom engagement, 6% drop in math achievement in the fourth grade. A limitation of the study was that math and reading achievement tests were not measured. Victimization categories were defined as being called names, being hit or pushed and was made fun of by other children. By the fourth grade, each 1 hour increase of early media exposure resulted in a 10% increase in the teacher-rated measure of victimization. While the topic of reactive aggression in relation to victimization was tracked and
no relation was noted, the topic of bullying in schools was not mentioned. Sedentary habits across four levels of tracking were all impacted by early media exposure. Sedentary video game use increased by 10%, weekend physical activity decreased 13%, with general fitness, and inclination towards activities involving physical effort decreasing by 9%. For measured dietary intake, the score on fruit and vegetable intake lowered 16%. While an increase of roughly 10% in soft-drink and snack consumption was measured. In all, media viewing during between 2 and 5 years old had noticeable effects on children by the fourth grade. Lower academic performance, victimization, sedentary habits, and dietary intake were all identified and associate with viewing media during the early years of brain development. According to Wardle (2009) “the first 10 years (but especially the first five years of life)” (p. 282) are the most critical for human brain development. Pagani et al. (2010) suggest additional parental compliance with the American Academy of Pediatrics (AAP) recommended viewing guidelines for young children.

In the fall of 2012, 1870 children from 4th and 7th grade in took part in the Massachusetts Childhood Obesity Research Demonstration (MA-CORD) study. Their BMI was measured while physical activity and diet information were collected through a SPAN survey. Additionally, questions of sleep duration, television in the bedroom and duration of screen time were collected via self-reporting. The purpose was to examine associations between screen time (television and computer only), diets, physical activity, and sleep. The survey questions asked about their activity of the previous day and the previous week. Just under half of the children were overweight or obese. The 7th graders reported insufficient sleep at 80%, while the 4th graders reported only 49%. In total the average daily screen time was 4-5 hours, with 75% reporting a television in their bedroom. The data was then processed through SAS software. Through adjusted models Franckle et al. (2015) discovered, “students who reported sleeping <10
hours/day consumed soda more frequently ($\beta=0.11$, 95% CI: 0.03, 0.20) and vegetables less frequently ($\beta=-0.09$, 95% CI: −0.18, −0.01) compared with students who reported ≥10 hours/day” (p. 38). A significant factor of this study included data association to all the physiological needs including media use. Between sleep and diet, no definitive determination could be made if screen-time was the result of drinking caffeinated soda while screen watching (confounder) or a sleep aid (mediator), or possibly lack of sleep promoting poor food choices. No data was collected on socioeconomic status, nor specific dietary intake. The students were asked about how many times they exercised more than 30 minutes a day during the prior week, and the results averaged from 2 - 3 days. Only 30 minutes of daily physical activity was surveyed, opposed to questioning the Centers for Disease Control and Prevention (2015) daily recommended 60 minutes of aerobic, strength and bone exercise. The researchers do suggest future research should include greater focus on diet intake. As well studies should consider focusing on sleep education for children, parents and communities.

A cross-sectional study of data from the 2009-2010 National Health and Nutrition Examination Survey was performed by Fakhouri, Hughes, Brody, Kit and Ogden (2013). It describes the percentages of children ages 6-11 who were within the recommended guidelines for physical activity and screen-time viewing. The recommended guidelines for moderate-to-vigorous physical activity (MVPA) were 60 minutes and 2 hours or less of screen-time viewing. This is in line with current Centers for Disease Control and Prevention (2015) daily recommended 60 minutes of aerobic, strength and bone exercise and American Academy of Pediatrics recommendation that children limit sedentary viewing activity to 2 hours per day or less. The overall finding was “approximately 70% of elementary school–aged children met physical activity guidelines, and about 54% met screen-time viewing guidelines” (Fakhouri et
al., 2013, p. 227). An interesting note is that while individually the recommendations were met “both physical activity and screen-time are independently associated with obesity” (Fakhouri et al., 2013, p. 228) and fewer than 40% of the children met both the recommendations simultaneously. The researchers compared 2001-2006 NHANES, Sisson et al., (2009) results with their 2009-2010 data set and showed a roughly 10% increase in proportion per child group exceeding the 2 hour viewing recommendation. Roughly half of the children in the 6-11 year old group exceeded the 2 hour viewing recommendation. Differences were noticed between the older children 9 - 11 and the younger group of 6 - 8 year old children. The group of children least likely to meet both recommendations were children who were obese, and children in the 9 -11 age group. An additional factor for not meeting recommendations were children in households with lower family income as determined by a family income to poverty level ratio (FIPR). Fakhouri et al. (2013) admit that they are unable to infer causality due to cross-sectional analysis. Analysis was performed with SAS software. Gathering physical activity data is still an issue due to the errors associated with both self and parental reporting. In this study, BMI is the measure for determining obesity. Recommended future research involve clarifying the association between physical activity, obesity and screen-time viewing.

The importance of the cohort study based on longitudinal data of 3427 Australian children was in finding a bidirectional relationship between sleep duration and screen time (media use excluding phones or tablets). By obtaining three waves of data for specific children at 4-5, 6-7 and 8-9 years of age, the researchers were able to examine long term relationships at different ages and predict bidirectional outcomes. For example, Magee, Lee and Vella (2013) determined “total media use at 4 years of age was significantly associated with sleep duration at 6 years of age ($\beta = -0.06 [95\% \text{ CI, } -0.10 \text{ to } -0.02]$), with media use at 6 years of age predicting
sleep duration at 8 years of age ($\beta = -0.06 \ [95\% \ CI, -0.11 \ to \ -0.02])$” (p. 1). Additionally they proved the inverse where “sleep duration at 4 years of age was associated with media use at 6 years of age ($\beta = -0.10 \ [95\% \ CI, -0.14 \ to \ -0.05]$), with sleep duration at 6 years of age predicting media use at 8 years of age ($\beta = -0.08 \ [95\% \ CI, -0.13 \ to \ -0.03]$)” (p. 1). The methods used consisted of body BMI collection, time diaries and statistical analysis with Mplus software. Parent and child kept 24 hour time diaries, for tracking activities every 15 minutes over a week for each wave. Tracking included sleeping, napping, television viewing and computer use. Covariates which notably stood out in tracking for potential issues with excessive media use and shorter sleep durations, were children with obesity, mothers with low education and households with lower socioeconomic status. Almost 20% of the children were obese and 50% had at least one sleep disorder. Predictions were realized into 1 hour of increased media use by a 6 year old child with obesity resulting in loss of almost 15 minutes of sleep duration two years into the future. Moreover, the prediction is independent of recommended duration of media use. A significant note in relation to this study is the current trend of decreasing television use and increase of total media use according to Loprinzi and Davis (2013). This study did not include mobile phones or tablet use. The researchers did suggest increased parental awareness of recommendations for healthy behaviors could possibly improve childhood outcomes regarding sleep duration and media use.

Methods

**Description of data collection approach.** This embedded convergent mixed methods study is designed to examine and compare the possible relationships between screen time, attention span and SOL test performance.
Quantitative and qualitative data will be collected online from online databases resources to be merged with data derived from an open-ended questionnaire. The online quantitative data will be analyzed to derive any patterns or links between screen time and matters related to academic performance as represented by SOL test scores. Specific data from chosen Prince William County Public Schools will be collected online. The timeframe of the data should not precede 2010. Comparison data will be collected specifically in reference pertaining to screen time, tied individually with restful sleep, healthy diet, and exercise. Specific online databases are as follows: Prince William County Public Schools (PWCPS), National Institutes of Health (NIH), American Academy of Pediatrics (AAP) and Centers for Disease Control and Prevention (CDC), United States Department of Agriculture (USDA), National Center for Education Statistics (NCES), United States Environmental Protection Agency (EPA) and Virginia Department of Education (VDOE).

The online qualitative data will be providing information specific to Maslow’s needs of the physiological in relation to screen time and studies by experts in the fields of child development. Data will be collected specifically in reference pertaining to screen time tied individually with restful sleep, healthy diet, and exercise.

An open-ended questionnaire will be distributed to special education teachers at specifically selected Prince William County Public Schools. The purpose of the open-ended questionnaire is to gain the perspective from the professionals who interact most with the special needs students and parents. The intent is to gain their perspective on the actual and prescribed use of screen time by students in relation to the physiological needs of exercise, healthy diet and restful sleep. As well to comment on if any difference of perspective between their AD/HD and
learning disabled children. Finally, they will be asked to give their perspective on preparing children for the SOL testing.

**Population.** The online quantitative data participants are physiological data trends of United States children in the 3rd through 5th grade. The quantitative SOL test score data participants are specifically from the Prince William County Public Schools selected for the open-ended questionnaire.

The online qualitative data participants are educators, pediatricians, and psychologists who specialize and have conducted research in areas specific to the physiological needs of children in matters of screen time combined with exercise, diet, and restful sleep.

The open-ended questionnaire participants will be non-randomly selected from a naturally formed group of special education teachers at specific Prince William County Public Schools (PWCPS). Twenty four total participants, two special education teachers per-grade level, per-school will be selected. The grade levels represented are 3rd through 5th grade. A total of four elementary schools will be selected from PWCPS based on highest and lowest rate of state sponsored meal plans.

PWCPS special education teachers were chosen for their proximity to special needs students in their classrooms and parents. They are directly involved with student Individualized Education Plans (IEP) and meet with the parents and students to develop education plans, monitor, document, and discuss student progress, issues and concerns with students and parents.

**Recruitment of Participants.** Special education teachers will be recruited as unpaid volunteers, though will be offered a $20 Starbucks Gift Card upon completion of their participation. Part of the design in gaining the perspective of the special needs teachers is their
willingness for their children to succeed. Most would go the extra mile of answering five questions if it would perhaps shed light on a method that might increase the chances of their students’ success. Parent participants in the family media plan is voluntary and a 20% participation rate on behalf of parents is expected.

**Data Collection and Instrument Selection.** The data collection for this questionnaire stems from Maslow’s Theory of Human Motivation and the Hierarchy of the Physiological Needs as well as Egan’s Cognitive Tools Theory and five levels of understanding. According to Maslow, if all the needs are unsatisfied, and the organism is then dominated by the physiological needs, all other needs may become simply non-existent or be pushed into the background (Maslow, 1943). When a child is focused on needs other than learning, the body will not allow focus on learning. Of Egan’s five cognitive levels of understanding, this study focuses on the 3rd level which targets children ages 8 – 14. In the 3rd level, the main goal is the mastery of literacy. The main characteristics involve the acquisition of conventional skills involving getting along, writing and literacy, and to gain an appreciation for finer gradations in perception and thinking (Egan, 1997).

A mixed methods design is recommended for comparing different perspectives drawn from quantitative and qualitative data and the merging of two databases to show how the data converge or diverges (Creswell, 2014). The data collection by the researcher will be merged into a meta-synthesis of existing qualitative and quantitative research study instruments, plus a researcher designed open-ended questionnaire for qualitative data.

**Data Collection.** Two forms of data collection will be performed by the researcher. Using the convergent parallel mixed methods design, the researcher will perform data collection and analysis process for each database separately. The first will be collecting both quantitative and
qualitative data from online local and national databases online. This search is to build data to perform a meta-synthesis of from multiple sources to discern trends related to screen time and the physiological needs as proposed by Maslow and their relation to Egan’s 3rd level of cognitive understanding for children ages 8-14. The second form of data collection will be an open-ended questionnaire specifically for special needs teachers based on their proximity to Egan’s 3rd level of cognitive understanding for children ages 8-14. In the convergent parallel mixed methods design, the instruments are not dependent on each other. Rather the information they provide will help to gain a broader perspective of the topic and visualize the trends and issues associated with screen time.

Meta-Synthesis of Existing Data. Existing Data will be collected from existing qualitative and quantitative research study instruments and merged with a researcher designed open-ended questionnaire for qualitative data.

According to Creswell, (2014), merging the data involves combining the quantitative and qualitative data through procedures of side by side comparison, data transformation or joint display. The researcher will perform online searches through national database statistics and journals for topics relating to screen time in relation Maslow’s Hierarchy of the physiological needs (sleep, healthy diet, exercise). Additionally, the researcher is looking for trends in use of screens by children ages 8-14 for entertainment use as well as academics for data trends.

Children in general were targeted due to their early childhood development. Not just development of the physical body, but to investigate what measured effects screen time has on the development of “unique” physiological functions of the body for sleep, healthy diet and exercise.

Specific trends to research:
Trends in reduced sleep and eye fatigue (Myopia) will be charted and compared with trends indicating increased screen time by youths ages 8-14.

Trends in childhood obesity, poor diet and nutrition intake will be charted and compared with trends indicating increased screen time by youths ages 8-14.

Trends in youth fitness performance and exercise and activity will be charted and compared with trends indicating increased screen time by youths ages 8-14.

**SOL Test Data.** SOL test scores of special needs children will be targeted as a measure for academic success. Special needs student’s abilities and academic performance are monitored and documented locally as well as at the state and national levels. Students with special needs include not just learning disabled but children with a variety of special needs including ADHD. The National Assessment of Educational Progress tested children nationwide for reading skills. The results for reading tests for fourth-grade students were: Below the most basic level 38 percent; Proficient 31 percent, and Advanced 7 percent (U.S. Department of Education, 1999). According to Dana Gioia, Chairman, National Endowment of the Arts, the fact that nearly one-third of American teenagers drop out of school is deeply connected to declining literacy and reading comprehension.

The researcher will specifically look at the SOL test scores of specific schools dating back to 2010. The schools will be specifically chosen from the same county in Fairfax, Virginia. Statistics show that Fairfax County has some of the nation’s more advanced school districts. The schools chosen will be based on high and low percentage of children receiving food support from the school, to tie into Maslow’s theory of physiological need of food and to discern any relation to performance and nutrition.
The SOL test scores are maintained per school, per grade level on the Virginia Department of Education (VDOE) website. The SOL grade performance will be charted for trends in alignment with increased screen time by youths aged 8-14 or grades 3-8 respectively.

**Open-Ended Questionnaire Creation.**

An open-ended questionnaire will be created to gather the perspectives of the target audience in relation to the topics surrounding the physiological effects of screen time on special needs children.

The targeted participants of the open-ended questionnaire will be 24 special needs teachers. The special needs teacher interacts with the students on a daily basis. They are aware of the issues, workload, academic capacity and capability of the child student. They maintain an Individualized Education Plan (IEP) for each child documenting their progress and address concerns. They meet with parents, school psychologist, peers and school administrators to discuss academic issues relating to each child. They are on the front line when it comes to addressing the academic needs of the special needs child in schools. They are in the unique position of observing trends and identifying changes in a child’s academic performance. Using a qualitative strategy of inquiry, these results may provide a detailed description of their experiences (phenomenology) (Creswell, 2014).

The 24 questionnaires will be distributed and collected via email to two special needs teacher per each grade level between 3rd and 5th grade at each of four elementary schools. The parents of each child will participate in an interview and complete an open-ended questionnaire.

Sample questions for Open-Ended Questionnaire
| Question 1 | What is your perspective on the balance of screen time and physical exercise for special needs children? |
| Question 2 | What is your perspective on the balance of screen time and restful sleep for special needs children? |
| Question 3 | What is your perspective on the balance of screen time and healthy diet for special needs children? |
| Question 4 | What is your perspective on the balance of screen time and physical exercise for special needs children? |
Question 5 | What is your perspective on the balance of screen time and restful sleep for special needs children?

Question 6 | What do you see as the greatest concern facing the education of children in relation to screen time?

**Tentative Data Analysis Plan**

Data will be gathered from the online search to construct or utilize existing methods for capturing data for tracking participant data on diet, physical activity, sleep durations and total media use. Data will also be collected for construction of data sheets and video presentations explaining possible harm from excessive media use.
Secondly, data will be gathered from the special education teachers on their perspectives to analyze their view on media use and its relation to the physiological needs of the students.

Thirdly, data will be gathered from the parents on their perspectives to analyze their view on media use and its relation to the physiological needs of their child.

Lastly, the student SOL test scores will be collected into a meta-analysis with the data from the special education instructors, parents and students to gain a better picture of the topic.
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