Growing Up in Ireland
National Longitudinal Study of Children

Screen-Time versus Screen Type: The Impact of Screen Engagement on Cognitive Development in Irish 5 year olds

Chloé Beatty and Suzanne M. Egan
Department of Psychology,
Mary Immaculate College, Limerick

10th Annual Research Conference 2018

What is Screen Time?

- Early research uses the term 'screen time' to refer largely to TV watching

- In more recent years screen time has been used interchangeably to refer to both TV watching and engaging in interactive screen technology devices such as tablets, phones, or video games

  (Strasburger et al., 2013)

- Has been an area of interest for researchers in physical development (i.e. Screen time and Obesity)

  (Peck, Scharf, Conaway, & DeBoer, 2015)

Extent of Screen Time Use

- 85% of children under 24 months were reported to be watching over 2 hours of TV daily

  (Early Childhood Ireland, 2016)

- In the UK – 75% of children under three have daily use of a touchscreen device

  (Bedford et al., 2017).

- In America – 75% of children *owned* mobile devices, with most using digital devices before they were 12 months old

  (Kabali et al., 2015)

- Growing Up in Australia dataset:

    2-3 hours a day engaging in TV viewing

    <30 minutes with digital devices

    (Australian Government: Department of Health and Ageing, 2011)

- In the UK: 1.75 hours watching TV,

    25 minutes on computers

    15 minutes on smartphones, and

    29 minutes on tablets

    (Lauricella, Wartella, & Rideout, 2015)

Changing with the times

- Daily TV viewing decreased from 79% to 63% from 2005 to 2014, and exposure to DVDs/Videos also dropped from 65% to 32% in the same time period

  (McClure et al., 2015)

- Use of daily touchscreen devices jumped from 10% to 38% in just two years for children under the age of 3 years

  (Rideout, 2011; 2013)

- 0–5 year olds used touchscreens on average for 79 minutes per day, an increase from the 20 minutes per day reported in 2014

  (Neumann, 2014; Marsh et al., 2015)

Is there a difference between types?

- Research on physical development suggests so –

    In studies concerned with cardiovascular risks, blood pressure and obesity, TV was the only form of screen time to indicate a negative impact on physical health

    (Anderson, Economos, & Must, 2008;
    Stamatakis et al., 2013)

- TV viewing doesn't even have the same effect as sedentary time. Computer use, painting, sitting, and reading are not positively associated with high blood pressure.

    (Gopinath et al., 2012)

Is there a difference between types?

- 'Video Deficit' – Difficulties learning from a screen i.e. Imitating actions, word-learning, and language-recognition tasks
- However, this only stands for TV viewing

    (Kirkorian, Choi, & Pempek, 2016; Neumann, 2018)

- Higher cases of scaffolding (by devices themselves)

    (Yelland & Masters, 2007)

- Child Interaction – The multisensory features and presence of in-built support features in child-directed educational apps

    (Neumann, 2018)

Is there a difference between types?

- Cause and Effect – Children from as young as 6 months of age have an interest in the cause and effect phenomena

$$\text{(Lerner and Ciervo, 2003)}$$

- Computer games were also found to improve spatial awareness, attention, multi-tasking, and perceptual abilities in children

$$\text{(Spence and Feng, 2010)}$$

- Computer use during the preschool years is associated with improvements in school readiness and cognitive development, and ICT classes improving maths and science grades

$$\text{(Li \& Atkins, 2004; Delen, 2016)}$$

Is there a difference between types?

- Fast-paced video games and aggression and ADHD

  (Kostyrka-Allchorne et al., 2017)

- Delays in language development

  (Kostyrka-Allchorne et al., 2017)

- Increase risk for mental health problems

  (Twenge & Campbell, 2018)

- AAP's recommendations for less than 2 hours of screen time exposure

- Participants – 9,000 Irish 5 year olds (1 in 7)

- Design – Secondary research, analysis of Growing Up in Ireland dataset
  - 2 DVs = Reasoning Ability, Vocabulary Development
  - 2 IVs = Amount of Screen Time exposure (4 groups), and Type of Screen Time Exposure (5 groups)

- Materials – Primary Caregiver Questionnaire (Screen time variables) & British Abilities Scale (Pictures Similarities task and Naming Vocabulary task)

- Procedure – Discriminate variables of interest, compute Statistics, including Hierarchical Multiple Regressions

Results - Type of Screen Time

Children who engaged in mostly educational games and TV viewing scored significantly lower than the other groups in reasoning ability

Children who engaged in mostly computer or video games scored significantly lower than all other groups in vocabulary development
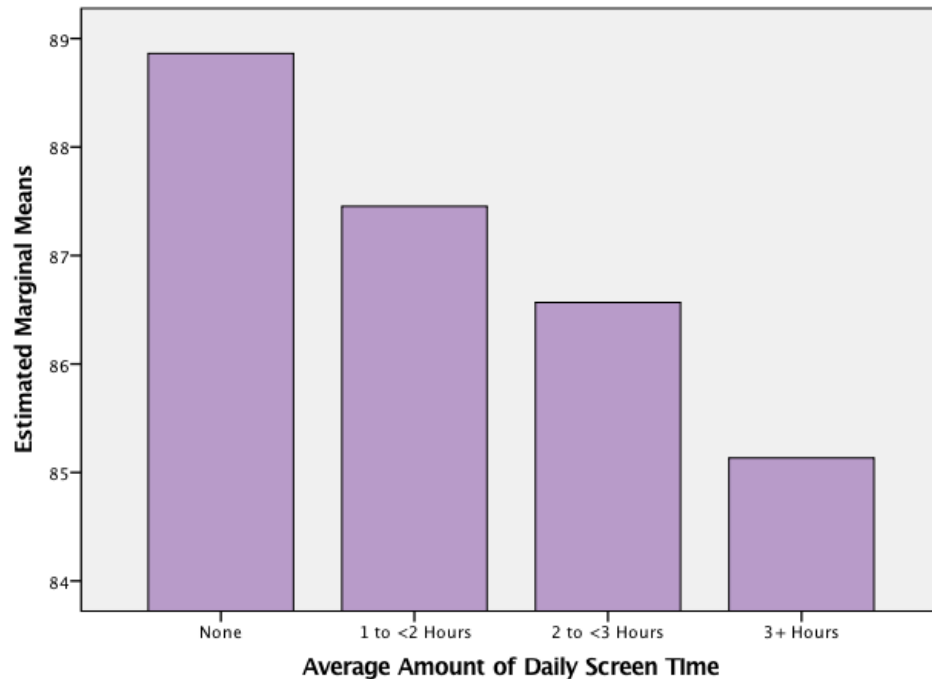

Mean Score for Picture Similarities Task
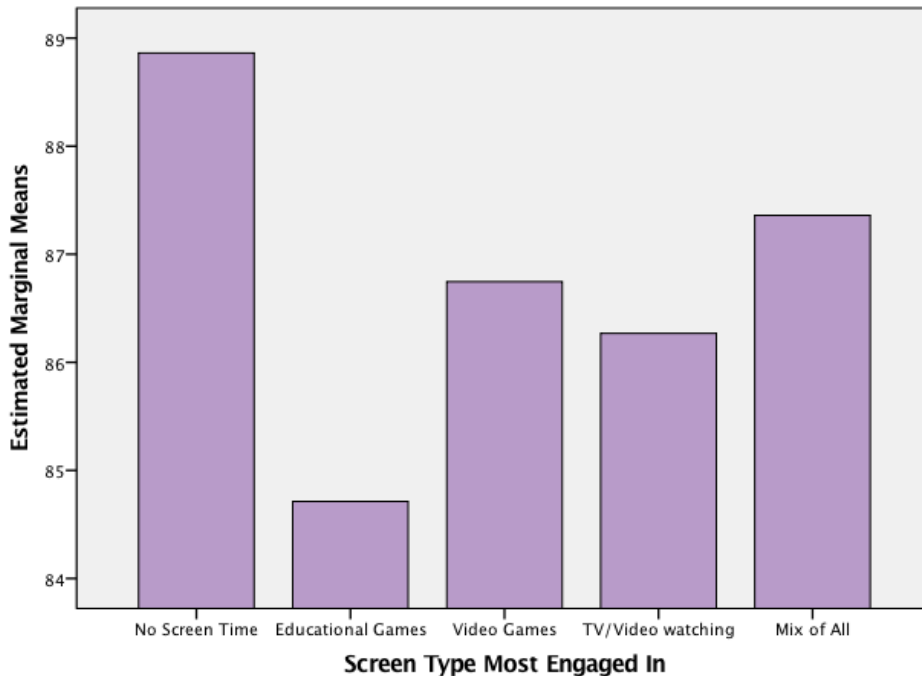
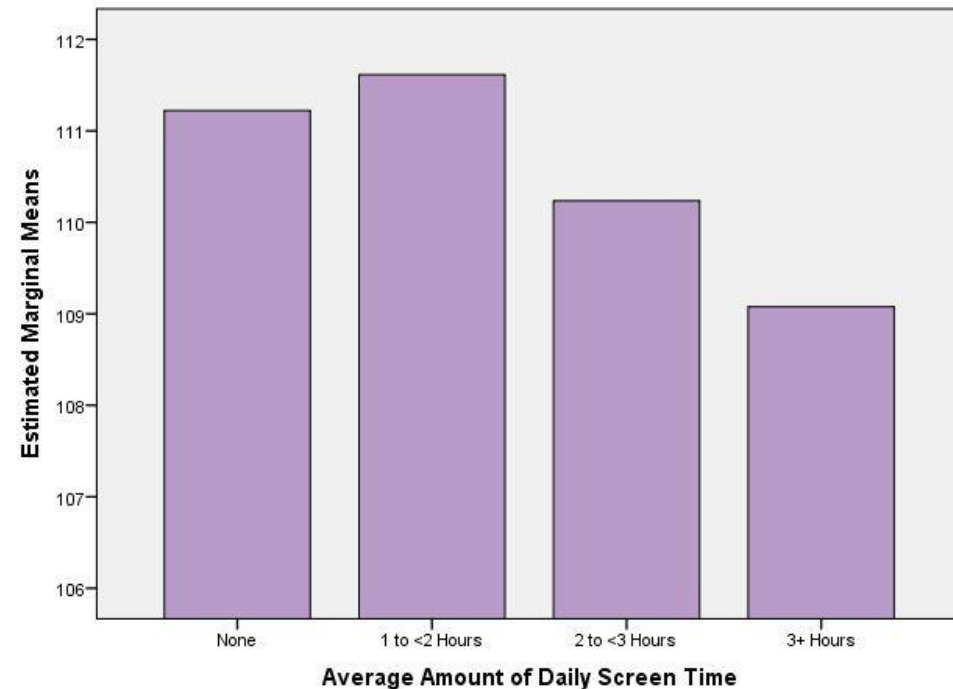**Mean Score for Naming Vocabulary Task**
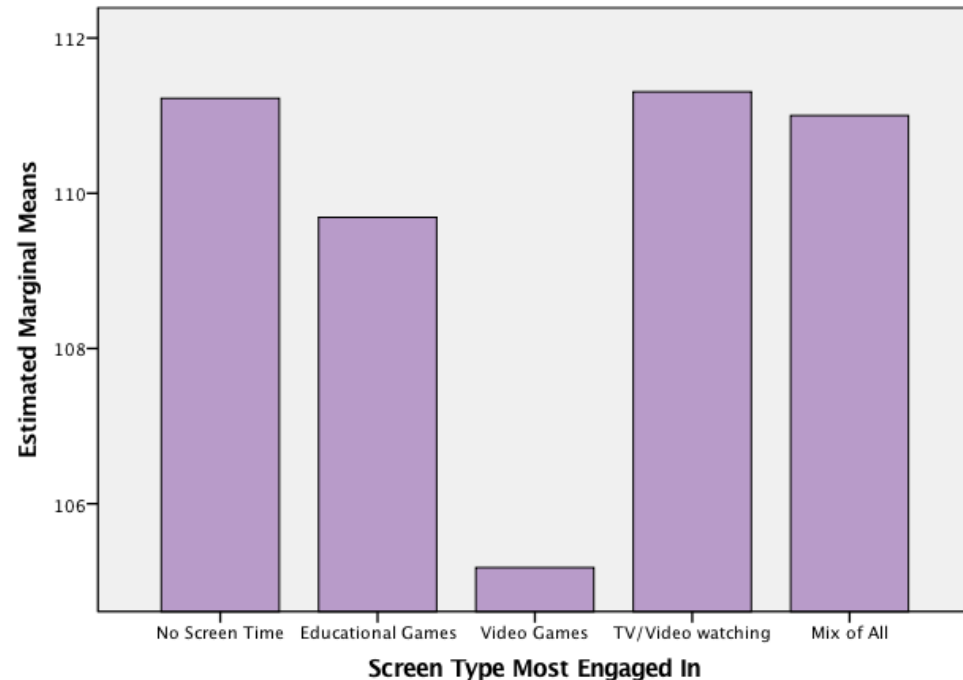
Results - Daily Screen Time

Children who engaged in screen time for more than two hours a day had significantly lower cognitive scores overall than those who engaged in under two hours of daily screen time

Mean Scores for Picture Similarities Task

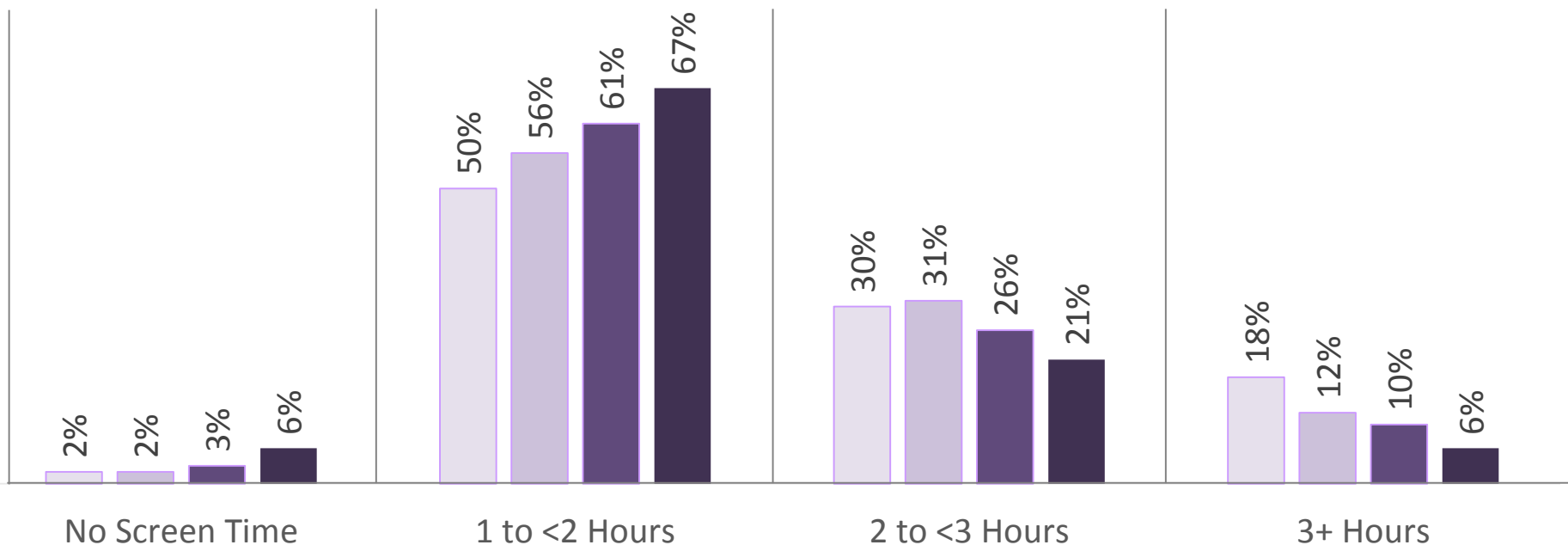Mean Scores for Naming Vocabulary Task

External Factors Impacting on Screen Time

Child Screen Time And Primary Caregiver's Educational Achievement

Legend:
- ☐ Technical Qualification / Apprentice
- ☐ National Certificate
- ☐ Third Level Bachelor Degree
- ☐ Masters or PhD

No Screen Time: 2%, 2%, 3%, 6%
1 to <2 Hours: 50%, 56%, 61%, 67%
2 to <3 Hours: 30%, 31%, 26%, 21%
3+ Hours: 18%, 12%, 10%, 6%

Hierarchical Multiple Regressions

- 5 Step Model – Screen Time Variables and Home Environment Factors (Parent Education, Employment, Attachment, Siblings)

Reasoning Ability

Significant impact of:

- 'No Screen Time',
- 'Mix of All'
- 'More than 3 hours'

Even after other factors are accounted for

Variable	β	Sig.	R²
Step 5			.027
(Constant – TV & 1 to < 2 Hours)	75.304	.000	
No Screen Time	1.973	**.013***	
Educational Games	-1.321	.190	
Video Games	.876	.259	
Mix of all	1.189	**.000***	
2 to < 3 hours	-.565	.052	
3 + hours	-1.699	**.000***	
Employment Status	.435	.000	
Education Level	.367	.000	
Level of Closeness	.300	.000	
Level of Conflict	-.097	.000	
Parental Stress Score	-.083	.017	
Siblings	.623	.121	

Hierarchical Multiple Regressions

- 5 Step Model – Screen Time Variables and Home Environment Factors (Parent Education, Employment, Attachment, Siblings)

Vocabulary

Significant impact of:

- 'Video games'

Even after other factors are accounted for

Variable	β	Sig.	R²
Step 5			.034
(Constant – TV & 1 to < 2 hours)	89.713	.000	
No Screen Time	-.969	.421	
Educational Games	-1.459	.342	
Video Games	-5.359	.000*	
Mix of all	-.203	.616	
2 to < 3 hours	-.456	.303	
3 + hours	-.880	.141	
Employment Status	.760	.000	
Education Level	.760	.000	
Level of Closeness	.559	.000	
Level of Conflict	-.065	.091	
Parental Stress Score	-.231	.000	
Siblings	-2.534	.000	

- Screen time contributed to lower cognitive scores when children engage in over 3 hours per day of screen time

- As seen from the scores on both cognitive scales, the type of use seems to impact cognitive scores, particularly game use

- Unknown if a similar trend will appear for younger children

- Unknown what impact more contemporary forms of screen interactions have i.e. use of smartphones and touchscreens

Considerations

- Parental Engagement – Talk time, Scaffolding, and Language Development

  (Pempek et al., 2011; Lavigne, Hanson, & Anderson, 2015)

- Content – Educational content or child-directed content have better cognitive outcomes at a later age

  (Wright et al., 2001; Linebarger & Walker, 2005)

- CyberSafe Ireland

Implications

- Governmental policies and regulations on screen time habits (advice for parents)

- Irish Classroom Setting – Moving from traditional to incorporating technology use

    (McCoy, Smyth, & Banks, 2012)

- Expanding research on a relatively unexplored area

Thank You

This research is funded by MIC Departmental Assistantship Award
chloe.beatty@mic.ul.ie

Cognition, Development and Learning Lab @MIC

References

Anderson, S. E., Economos, C. D., & Must, A. (2008). Active play and screen time in US children aged 4 to 11 years in relation to sociodemographic and weight status characteristics: a nationally representative cross-sectional analysis. *BioMed Central Public Health, 8*(1), 366.

Australian Government: Department of Health and Ageing (2011). *Get Up and Grow: Healthy Eating and Physical Activity for Early Childhood*. Family Book.

Bedford, R., Saez de Urabain, I. R., Cheung, C. H., Karmiloff-Smith, A., & Smith, T. J. (2017). Toddlers' Fine Motor Milestone Achievement Is Associated with Early Touchscreen Scrolling. *Frontiers in Psychology, 7*, 1108.

Delen, E., & Bulut, O. (2011). The relationship between students' exposure to technology and their achievement in science and math. *The Turkish Online Journal of Educational Technology.*

Early Childhood Ireland (2016). *Children's Use of Technology*. Early Childhood Ireland Annual Report.

Gopinath, B., Baur, L. A., Hardy, L. L., Kifley, A., Rose, K. A., Wong, T. Y., & Mitchell, P. (2012). Relationship between a range of sedentary behaviours and blood pressure during early adolescence. *Journal of Human Hypertension, 26*(6), 350.

Kabali, H. K., Irigoyen, M. M., Nunez-Davis, R., Budacki, J. G., Mohanty, S. H., Leister, K. P., & Bonner, R. L. (2015). Exposure and use of mobile media devices by young children. *Pediatrics, 136*(6), 1044-1050.

Kirkorian H. L., Choi K., Pempek T. A. (2016). Toddlers' word learning from contingent and non-contingent video on touchscreens. *Child Development, 87,* 405–413.

Kostyrka-Allchorne, K., Cooper, N. R., & Simpson, A. (2017). The relationship between television exposure and children's cognition and behaviour: A systematic review. *Developmental Review, 44*, 19-58.

Lauricella, A. R., Wartella, E., & Rideout, V. J. (2015). Young children's screen time: The complex role of parent and child factors. *Journal of Applied Developmental Psychology, 36,* 11-17.

Lavigne, H. J., Hanson, K. G., & Anderson, D. R. (2015). The influence of television coviewing on parent language directed at toddlers. *Journal of Applied Developmental Psychology*, *36*, 1-10.

Lerner, C., & Ciervo, L. A. (2003). *Healthy minds: nurturing children's development from 0 to 36 months.* Washington, DC: Zero to Three Press and American Academy of Pediatrics.

Li, X., & Atkins, M. S. (2004). Early childhood computer experience and cognitive and motor development. *Pediatrics, 113*(6), 1715-1722.

References

Linebarger, D. L., & Walker, D. (2005). Infants' and toddlers' television viewing and language outcomes. *American behavioral scientist*, *48*(5), 624-645.

Marsh, J., Plowman, L., Yamada-Rice, D., Bishop, J. C., Lahmar, J., Scott, F., et al. (2015). *Exploring Play and Creativity in Pre-Schoolers' Use of Apps: Final Project Report.* Available at: http://www.techandplay.org/download-report

McClure, E. R., Chentsova-Dutton, Y. E., Barr, R. F., Holochwost, S. J., & Parrott, W. G. (2015). "Facetime doesn't count": Video chat as an exception to media restrictions for infants and toddlers. *International Journal of Child-Computer Interaction, 6*, 1-6.

Neumann, M. M. (2014). An examination of touch screen tablets and emergent literacy in Australian pre-school children. *Australian Journal of Education*, *58*(2), 109-122.

Neumann, M. M. (2018). Using tablets and apps to enhance emergent literacy skills in young children. *Early Childhood Research Quarterly*, *42*, 239-246.

Peck, T., Scharf, R. J., Conaway, M. R., & DeBoer, M. D. (2015). Viewing as little as 1 hour of TV daily is associated with higher change in BMI between kindergarten and first grade. *Obesity*, *23*(8), 1680-1686.

Rideout, V. J. (2011). *Zero to eight: Children's media use in America.* San Francisco, CA: Common Sense Media.

Rideout, V. J. (2013). *Zero to eight: Children's media use in America.* San Francisco, CA: Common Sense Media.

Spence, I., & Feng, J. (2010). Video games and spatial cognition. *Review of General Psychology*, *14*(2), 92.

Stamatakis, E., Coombs, N., Jago, R., Gama, A., Mourão, I., Nogueira, H., ... & Padez, C. (2013). Type-specific screen time associations with cardiovascular risk markers in children. *American Journal of Preventive Medicine, 44*(5), 481-488.

Strasburger, V. C., Hogan, M. J., Mulligan, D. A., Ameenuddin, N., Christakis, D. A., Cross, C., ... & Moreno, M. A. (2013). Children, adolescents, and the media. *Pediatrics, 132*(5), 958-961.

Twenge, J. M., & Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports, 12*, 271-283

Wright, J. C., Huston, A. C., Murphy, K. C., St. Peters, M., Piñon, M., Scantlin, R., & Kotler, J. (2001). The relations of early television viewing to school readiness and vocabulary of children from low-income families: The early window project. *Child development*, *72*(5), 1347-1366.

Yelland, N., & Masters, J. (2007). Rethinking scaffolding in the information age. *Computers & Education*, *48*(3), 362-382.