The Appropriate Age for Technology in a Digital Age

By: Abbie VonBargen

Abstract

The purpose of this meta-analysis was to discover if implementing technology in the classroom before grade three is beneficial or inhibiting to developmental growth. The following study examined 10 articles which focused on educational technology being implemented in the classroom and its effects socially, behaviorally, cognitively, and developmentally. The results reflect that technology in the classroom is a phenomenon that cannot be avoided completely, but should be extremely limited until at least third grade. The findings support a need for technological literacy among educators and parents, fine motor development activities, group work, and time for children to use their own creativity.

Introduction

As modern technology has advanced in recent decades, every profession is learning how to implement smart devices into the workplace. This also applies to the field of education. While advancements in technology have improved many scenarios, can too much of a good thing become bad? At what age should technology be introduced in the school system?

Previous Studies:

- ★ Technology has negative effects on the brain cognitively and behaviorally (Impacts, 2019).
- ★ Technology is useful for students who are ESE or ESOL (Arabiat et al., 2021).
- ★ A teacher and parent's discipline with technology largely reflects if the child is learning (Francom, 2020).
- ★ Technology distracts from fine motor skill and social skill development (Vanderloo et al., 2022).

Research Method for Meta-Analysis

- ★ Procedure: This meta-analysis took place over the course of 14 weeks. In order to find appropriate sources, Academic Search Complete and JSTOR were used. In order to filter the material, The terms *kindergarten*, *early childhood*, *educational technology*, and *development* were used. I chose 10 peer reviewed, qualitative, quantitative, and mixed method studies. All research was published between 2017 and 2024. Eight out of the 10 articles focus on elementary with two focusing on preschool.
- ★ Data Analysis: An annotation was created for each article, resulting in an annotated bibliography. Then the articles were categorized into the following themes: (a) medical repercussions of technology usage, (b) lack of training staff/ parent knowledge leads to inefficient usage, and (c) avoid technology under grade three.

Findings

Medical Repercussions of Technology Usage:

- ★ Smart device usage is correlated with a higher rate of inattentiveness and hyperactivity along with anger management and temperament among children (Hosokawa & Katsura, 2018).
- ★ Excessive internet usage has been linked to reduced volume in several parts of the brain along with lower cognitive functioning (Ricci et al., 2022).

Lack of Training Staff/ Parent Knowledge Leads to Inefficient Usage:

- ★ Parents who use the TV or iPads to distract or occupy their kids are altering the amount of physical interaction the child gets. It was seen that children from ages four to six who were consistently given screen time, had more distant parent-child relationships and lacked social skills (Gath & Gillon, 2023).
- ★ A buddy system could be useful to allow teachers who are not familiar with technology to pair up and learn from those who are in order to use technology efficiently in the classroom (Winter et al., 2021).

Avoid Technology Under Grade Three:

- ★ Kindergarteners can barely read or write, so when they are expected to use a computer it is inefficient and nearly impossible for them to do it independently (Lawrence, 2022).
- ★ Technology usage in early childhood students correlates to sleep routines and patterns. Being on a screen tricks the brain into thinking the blue light means it is daytime (Vanderloo et al., 2022).

This image depicts kindergarten students working with hands on materials.
Image: Teachersmag.com

This image depicts kindergarteners working and learning independently on their computer.
Image: The Hechinger Report

Discussion

1. If technology is going to be used in the classroom, teachers and need to be trained indepthly on how to implement this instruction. Intensive training on how to adequately use computers to practice or teach content without them becoming a babysitter is a must for the learning to be productive and efficient. Teachers must be trained, because many come from generations where this level of technology has not been present for a majority of their lives.

2. COVID-19 has contributed to an increase in technology usage, and and correlates with an increasing slump in all areas. With the recent pandemic, technology has become a staple for learning. This has been correlated to children regressing in their educational skill levels and entering kindergarten far behind the readiness line. It has been linked to an increase in behavioral problems. This exemplifies a need for pre-COVID instruction.

3. Technological learning usage to hands-on learning usage ratio needs to be assessed and monitored.
In the classroom, if more technology is being used to teach students concepts than hands on instruction, the children are lacking fine motor and social development. Hands-on instruction allows for more creativity among students.

Future Directions: Future studies should address specific details on when technology should be used in the classroom in grades k-2, and what type of content they should be interacting with. Future studies should also analyze statewide regulations, and the variety of technological instruction from school to school.

References

Arabiat D., Al Jabery M., & Robinson S. (2021, September 1) *Interactive technology use and child development.* - diva. (2023). http://www.diva-portal.org/smash/get/diva2:1724805/FULLTEXT01.pdf

Francom G. (2020). *Barriers to technology integration: A time-series survey study.* Journal of Research on Technology in Education, 52.1, 1-16, DOI: 10.1080/15391523.2019.1679855

Gath, M., McNeill, B., & Gillon, G. (2023). Preschoolers' screen time and reduced opportunities for quality interaction: Associations with language development and parent-child closeness. *Current Research in Behavioral Sciences, 5.* https://doi.org/10.1016/j.crbeha.2023.100140

Hosokawa, R., & Katsura, T. (2018). Association between mobile technology use and child adjustment in early elementary school age. *PloS one, 13*(7), e0199959.

Impacts of technology use on children: Exploring Literature on the Brain, Cognition, and Well-being - OECD. (2019). https://one.oecd.org/document/EDU/WKP%282019%293/En/pdf

Lawrence, A. (2022). *Digital Commons @ CSUMB. Effects of Increased Use of Technology on Elementary Students in the Classroom .* https://digitalcommons.csumb.edu/cgi/viewcontent.cgi?article=2444&context=caps_thes_all

Ricci, R. C., Paulo, A. S. C., Freitas, A. K. P. B., Ribeiro, I. C., Pires, L. S. A., Facina, M. E. L., Cabral, M. B., Parducci, N. V., Spegiorin, R. C., Bogado, S. S. G., Chociay Junior, S. Carachenti, T. N., & Larroque, M. M. (2022). Impacts of technology on children's health: A systematic review. *Revista Paulista de Pediatria : Orgão Oficial da Sociedade de Pediatria de Sao Paulo, 41,* e2020504. https://doi.org/10.1590/1984-0462/2023/41/2020504

Vanderloo, L. M., Omand, J., Keown-Stoneman, C. D. G., Janus, M., Tremblay, M. S., Maguire, J. L., & Birkhoff, C. M. (2022, February 1). Association between physical activity, screen time and sleep, and school readiness in Canadian children Aged 4 to 6 Years. *Journal of Developmental & Behavioral Pediatrics, 43*(2), 96. https://doi.org/10.1097/DBP0000000000000986

Williams C. & Beam S. (2019). Technology and writing: Review of research, Computers & Education, Volume 128, Pages 227-242, ISSN 0360-1315, https://doi.org/10.1016/j.compedu.2018.09.024.

Winter E., Costello A., O'Brien M., & Hickey G., (2021). *Teachers' use of technology and the impact of Covid-19.* Irish Educational Studies, 40-2, 235-246, DOI: 10.1080/03323315.2021.1916559

SF SANTA FE COLLEGE