DIGITAL TECHNOLOGY AND CHILDREN'S COGNITIVE DEVELOPMENT: A QUALITATIVE STUDY

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Qualitative Research Review Letter

Abstract

The purpose of the study is to explore the role of technology through mother's experiences in the cognitive development of children. The sample of the study consists of six stay-at-home mothers who have children around 5 to 11 years of age. In-depth semi-structured interviews were conducted and after transcribing the data was analyzed through thematic analysis. The findings of the study highlight a broad range of themes that cover the general perception of technology, how digital technology is being used by mothers and children at home, and how it impacts their nature of attachment. Moreover, the impact of digital technology on the cognitive abilities, social conduct, and self-governance of children is also thoroughly researched. The study explored that digital technology is an effective tool for learning and connecting with family and helps in improving cognitive abilities. However immoderate use of digital technology can be harmful and may disturb the natural development of attachment of children with their parents, especially mothers. This risk is increasing day by day as technology is normally being used as a digital nanny for children.

Keywords: digital technology, cognitive development, children, perception, cognitive abilities

1. Introduction

This research study aims to understand how the attachment of children with their parents, specifically with mothers is influenced by the use of modern-day technology and its impact on children's cognitive development. The theoretical basis of the research study is based on **Bowlby's Attachment Theory** and the **Sociocultural Theory of Vygotsky**

The development of cognitive processes and secure attachments of children are deplorably influenced by the presence of digital

devices in our homes. The recent wave of technology has changed the sociocultural environment for the new generation. Children's excessive use of digital technology is being overlooked by their parents. This possibly has adverse effects on their cognitive development and if not regulated appropriately can result in insecure and unhealthy attachment styles among children.

Previously researched extensive viewing of television and increased use of computers by children less than two years of age have indicated negative effects on children's cognitive development. Birken et al (2012) have indicated that increased exposure to digital screens can lead to language delays. World Health Organization (2014) has warned about the exposure of infants to the harmful radiation emitted by digital devices and its effect on their cognitive development and health. Therefore, the purpose of this study is to explore the role of digital technology in the cognitive development of children and what part it plays in the natural development of attachment between a child and his parents, especially mothers.

Bowlby's Theory of Attachment states that children have an instinctive need to form attachments as a survival mechanism. The attachment of a child to his mother is unique and crucial for his cognitive and social development for the first two years of his life (Mcleod, 2017). A complete failure and constant disruption in a secure attachment can have a long-term effect on the child's cognitive, social, and emotional development.

Keeping this theory as the backbone of the research study, we assume that the exposure of digital technology to young children interferes with the natural bonding of a mother and a child. The development of attachment between a mother and a child is not organic anymore, rather, technology is involved as a source of connection and bonding. The nature of this basic relationship is

further reflected in other relationships of the child, for instance with their siblings and peers.

Courtney and Sims (2019) highlight the importance of secure attachment in early childhood. Their study sheds light on how technology threatens the development of secure attachment between a mother and child. Parents, especially mothers, spending more time on smartphones minimizes their attention towards their children. Interference of any form of technology can disrupt the quality of maternal attachment. Furthermore, technology has now become a playmate and babysitter for young infants which negatively impacts their cognitive and social growth. Their study concludes that while technology may be a source of social connection it interferes with the development of healthy and secure attachments between a mother and a child.

Guo (2017) conducted a study on the impact of technology on the attachment styles and social skills of children. The sample consisted of 200 children under the age of 18. The study explored the impact technology has on children's cognitive development and the application of digital devices as babysitters. The research study concluded with guidelines for effective use of technology and management of screen time. The findings suggest that during the infancy period, parents must focus on developing healthy and secure attachments with their children without the interference of technology. Parents must make use of physically interactive and cognitively stimulating activities such as board games, outdoor games, hiking, etc. to enhance the social skills of children.

The sociocultural theory of Vygotsky suggests that children's cognitive processes are grounded in the cultural values and beliefs that are acquired through social interaction. He emphasizes the importance of the environment on cognitive development.

Qualitative Research Review Letter

Focusing on this theory, we understand that in today's time, digital technology is a social and cultural tool. This tool enables children to consume a good deal of visual stimulus which is highly engaging and appealing for them. Now, children prefer to interact with their peers and family through the screen rather than through direct verbal communication or any physical sports. We assume that as a result, children are less interested in interacting with their family members in a screen-free environment. It is presumed that these habits likely lead to social and behavioral problems among children which can have adverse effects on their cognitive development.

Johnson (2006) presented a theoretical framework to explain the effect of internet use on the cognitive development of children. This theoretical framework was based on the cognitive information processing model, sociocultural theory, and PASS cognitive processing model. The researcher pointed out that the internet has become a cultural tool and a social stimulus that contributes to the cognitive development of children.

Subrahmanyam et al (2001) conducted research to see how the use of computer impact the cognitive development of children and adolescents. He collected data through self-reports from children, considering their age, gender, and ethnicity as well. The study concluded that playing computer games improved children's spatial and attentional skills. The moderate use of computers for email or internet access improves social skills and interpersonal relations. The study concluded by suggesting that further extensive and longitudinal studies are required to understand the long-term impact of excessive computer use on the cognitive processes and academic achievements of children.

Particularly during the global pandemic, digital technology became a learning tool for children as studies were shifted online. This research claimed to understand whether children learned

better through the online system or they began to neglect their studies due to unlimited access to technology during the lockdown. This will also shed light on the various techniques employed by parents to regulate and monitor children's screen time as well.

2. Method

The research study was based on the constructivist research paradigm and the basic qualitative research design was applied for the research study.

The sample of the research study was six stay-at-home mothers who were approached individually through a purposeful sampling strategy according to the inclusion criteria and convenience sampling. The inclusion criteria for the participants of this study were females who are stay-at-home moms, living in a joint family system with at least two children aged 5 to 10 years. Both mothers and children must have access to or have their own digital devices at home. All the participants were females aged from 28 to 35 years old with at least two children aged 5 to 10 years old. All participants lived in a moderate joint family system and had access to a variety of digital technology.

For conducting in-depth interviews, a semi-structured interview guide was developed based on the present literature review on the research topic. Before conducting the main interview, the selected participants were asked a few screening questions to assess their psychological distress. Following that, a pilot study was conducted to assess the reliability of the interview guide. Proper informed consent was taken from the participants. Out of six interviews, one was conducted face-to-face while the rest were conducted via audio call. Due to the prevalence of COVID-19 in Pakistan, interviews were conducted online to ensure the safety of the researcher and the participants. The duration of the online interview was about thirty to forty-five minutes.

Interview transcripts were transcribed. The transcribed data was analyzed by the technique of thematic analysis. Codes were generated from the transcribed data which were further categorized into minor themes and major themes. These themes are discussed in detail in the light of the literature review and the theoretical framework in the discussion section.
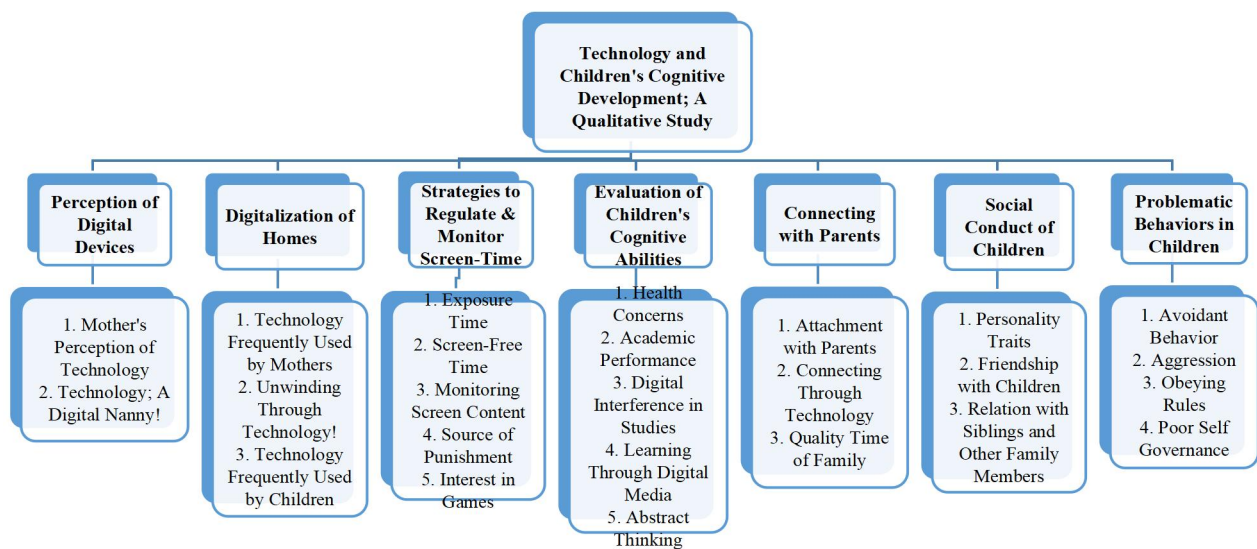
3. Discussion and Analysis

Themes were deduced from the collected data for analysis. The transcripts were coded and emerging themes were categorized into seven major themes. Participants' responses were further analyzed in light of the present literature review regarding the role of technology between a mother and a child and how it affects the cognitive development of children.

The main themes of this study include:

i. Perception of Digital Devices

ii. Digitalization of Homes

iii. Strategies to Regulate and Monitor Screen-Time

iv. Evaluation of Children's Cognitive Abilities

v. Connection with Parents

vi. Social Conduct of Children

vii. Problematic Behaviors in Children

This reflects participants' mixed perceptions regarding the use of digital technology by children. While they were aware of the harmful effects of technology, they emphasized the perceived benefits of technology for children. They believed that children learn more effectively through technology and acquire more complex concepts at a younger age. One participant stated, *"Digital technology is a good thing to help children learn. Children learn so much through digital technology that even a teacher is amazed that the child knows so much."* She further adds that *"it makes a lot of difference in children's abstract thinking."* Thus suggesting that digital technology boasts children's abstract thinking and IQ level.

At the same time, mothers showed concern over excessive exposure to technology. As said by a mother, *"Mobile phones can deteriorate your eyesight, even your mental and physical health as well. We are now aware of this because we searched about it."* They understood that exposure to digital technology at an early age may lead to early maturation of children and have adverse effects on their eyesight, mental health, and physical well-being. It was highlighted that exposure to digital technology increased significantly during the pandemic.

In 2015, a qualitative research study was conducted across seven European countries to explore the interaction of children aged 0 to 8 years with technology. Its findings revealed that the immediate perception of children's use of technology was negative yet parents preferred to believe that digital technology offers diverse benefits to children, especially concerning their apprehensive skills and general academic performance (Chaudron, 2015).

Mothers confessed that they use digital technology as a babysitter for their children, to manage house chores, or to serve guests at home. Some expressed their embarrassment while others provided casual reasons for their actions. Participant 6 shared that, *"when they (children) don't find anything to play with, we tell them 'to go and watch the computer' for a while. And if we don't want them (children) to sit or disturb us in front of the guests then we do this. For a quarter or half an hour, we ask them to use the computer so they can settle down."* From the sample of this study, only one mother understood the implications of the digital nanny on the health and development of the children. She rejected the idea by saying, *"No, my husband and I have a mutual understanding on this that we will not rely on these gadgets. So we make an effort that if I am busy he looks after the children and if he is busy then I look after them but we will not give them gadgets, no."*

The fact that mothers do not consider using technology as a nanny to be wrong is a matter of concern. Parents have a false belief that their children must always be engaged in some activity or playing with something. This is why, they provide their mobile phones or tablets to keep their children engaged in some activity (Aiken, 2017). The American Academy of Pediatrics advises parents not to introduce their children to any sort of technology before the age of two. Children at this age need to interact with their parents to develop a secure attachment with them and support the normal development of their brains (Nadirah, 2015).

The data of this study shows that the average age at which children are allowed to access or own any digital device is about two to seven years of age. Mothers claimed that children's exposure to digital technology was maximized when lockdowns were implemented in the country due to the spread of coronavirus. It must be noted that at this age children's cognitive development is

at its peak and this is the phase in which children's attachment with their parents either strengthens or weakens.

Chaudron (2015) explored similar topics in her qualitative study conducted across seven countries. The results of her research show that children use their digital devices individually and do not connect socially with their siblings or family members. Children's most favored digital device is their tablets. Mainly because it has more advanced features than a mobile phone and is more user-friendly than a laptop.

The study highlighted the most common strategy to regulate the exposure of digital technology is a fixed exposure time, which is about 4 hours a day. In case children exceeded their exposure time, they were grounded. Parents encourage their children to participate in creative and physical activities to reduce their digital exposure. One parent shared, *"We introduce more games towards them. We do arts, we do painting, we do coloring, and we do pottery. They make Lego or puzzles as well."* They try to incorporate screen-free time in children's daily routines by taking them out to engage in outdoor games or playing board games together. Studies show that children who play video games are better at decision-making, have better visual attention skills, and use their cognitive skills more effectively.

Mothers told us that they invigilate their children's digital activity by providing them the digital devices in their presence or under the supervision of another adult. Furthermore, they put security locks on certain applications that cannot be accessed by the children. A mother stated, *"I give it to her in my presence so I can check what she is watching. I tell her that all of her activities are being watched by the police. I also put a security lock on (other apps) when I give the mobile to her."*

Qualitative Research Review Letter

The American Association of Pediatrics, well-known for their contributions to child health recommends that children under eighteen months must not be exposed to any sort of screen, even the television. For kids around five years of age, only one hour of screen time is recommended (Gottschalk. 2019).

A key finding of this study is that in the digital period, grounding in digital technology is considered an effective way to discipline a child's behavior. Parents punish their children by taking away their digital devices not only to regulate their screen time but also as a negative consequence of their misbehavior. A mother confirmed this, *"If they have misbehaved with me then I tell them that 'You will not get it (mobile) for today. Then I don't give them the mobile that day. However, it (punishment) only has a mild effect on them."*

Wartella, Rideout, Lauricella & Connell (2014) of NorthWestern University conducted a national survey that discovered that parents use digital technology to either reward or discipline their children. Statistics show that eight out of ten parents confirmed that they ground children from TV time, using a computer or a gaming digital device when they display bad behavior.

The main focus of this qualitative study was to analyze the impact of digital technology on the cognitive development of children. This research was backed up by strong empirical evidence which indicates a significant link between digital technology and children's cognitive abilities. The study shed light on both sides of the coin, concluding that limited screen time is beneficial for children, but the content must be according to their cognitive and developmental levels. However, results also indicated a negative influence on children's language and cognitive skills (Barr & Lerner, 2014). One mother shared her concern, *"He is five years old, but I*

still feel like he does not speak some words clearly." However, no chronic problems, severe developmental delays, or serious speech or cognitive problems were found in the children in this study.

Children's academic performance was confirmed by the participants to measure their cognition and intelligence. Digital technology does contribute to children's academic success. One similar research revealed that children who had ownership of a gadget showed better academic success (Yesilyurt et al, 2014). Another study showed a significant difference in the results of the children who were being taught with the help of technology as compared to those who studied in a traditional classroom set-up (Al-Bataineh, Harris & Al-Bataineh, 2016).

Overall, mothers gave very positive feedback on their children's academic performance while acknowledging that children tend to ignore their studies due to excessive use of digital gadgets. Younger children find learning via online classes a bit tricky. One mother shared that, *"She picks up the concept taught by the teacher but she finds it difficult to understand the concept delivered through the videos. Then they give worksheets, which makes it easy for them (children) to conceptualize."* A large-scale study on students proved, to some extent, that high frequency of technology use has negative effects on the academic success rate of students (Wentworth & Middleton, 2014). Thus, we understand that digital technology is a beneficial tool for learning but is more suitable for children who have the required cognitive skills to assimilate information through digital media as compared to younger children (Weathersbee, 2008).

This research focused on the relationship of children with their parents, especially their mothers, and what role technology has in their relationship. Mothers disclosed that they share a very healthy and special relationship with their children. They balance,

both, a loving and strict demeanor with them. However, those who had a newborn expressed feelings of dissatisfaction with their elder children. Mother of two revealed that she has become distanced from her daughter after her second baby, "A" had a very good relationship with me, but then I had another baby and she became a little distant."   It was observed that these mothers reported high indulgence of children in digital technology and had a difficult time regulating their screen time. These children often behaved aggressively and irritably when grounded. Moreover, mothers with newborns also employ digital technology as a nanny for their children. A mother shared, *"My younger son is 4 months old and we all share the room, and if I have to put him to sleep, I sometimes have to provide it (mobile) to him (elder son)."*

Studies revealed that parents often choose to spend quality time with their children through digital technology (Kirkorian et al, 2009 & Lloyd, Dean & Cooper, 2007). A participant shared*, "On the weekend, when their father is at home we watch some children's movie together."* A systematic study of present empirical evidence revealed that when parents spend quality time without the involvement of technology it promotes family bonding and face-to-face communication within family members. It confirms that screen-free quality time decreases the engagement of individuals with digital technology (Tadpatrikar, Sharma & Viswanath, 2021). This was confirmed by our participants as well. One of them happily shared, *"On weekends, we usually go for outings. Or their aunts and cousins come here and we go somewhere out. On weekends, they are not interested in playing their games (on PlayStation)."*

Qualitative Research Review Letter

The findings of this study are in line with the present empirical evidence that aggression in children is influenced by unlimited screen time (Heidelberg, 2018). Mothers defined their children as hyper, aggressive, avoidant, and moody. They reported that children display signs of anger on insignificant matters. One participant stated, *"Avoiding family…yes it happens sometimes, when they are watching something they become so absorbed in it that they don't know what is happening around them."* While another shared that, *"He becomes very hyper, sometimes. He has broken a few things as well, two to three times. He punched his keyboard because he was unable to complete his missions (in-game)."* Thus, indicating some cognitive impairment among children to regulate their emotions properly. It was surprising that children who displayed signs of secure attachment with their parents also demonstrated avoidant behavior when indulged in digital activities. They further informed that applying strict regulatory strategies and reducing screen time helps in eliminating this behavior from children. A mother confirmed that *"Yes, he avoids the family because he is busy completing his game's missions. He began to ignore everyone a lot, so I and my husband limited his game time."*

Another problematic behavior that is explored in this study is rebellious behavior among children. This behavior was analyzed by the mother's responses on how their children followed and obeyed the rules and instructions. Participants gave mixed feedback regarding their children's obedience. One said, *"She gives a lot of importance to her teachers' instructions. So sometimes I use those (teachers) to make her follow my instructions. She properly follows the school's rules."* While another said, *"They follow the school's system properly. But at home, they create a lot of disturbance. When their father is at work they disturb a lot. And boys are a little*

stubborn by nature." Research shows that problematic behaviors are escalating in children due to increasing interference of technology between a mother and a child (McDaniel & Radesky, 2018).

4. Conclusion

To understand the consequences of digital technology on children's cognitive development, it is essential to be aware of the common perception of digital technology of mothers and how they make use of technology in looking after their children. We realize that children's indulgence in technology is not a modeled behavior, but rather the result of parents' utilization of technology as a digital nanny, despite being present at home. Children's curious nature enables them to discover a vast range of digital activities that they find attractive and interesting. However undue exposure leads to problematic behaviors in children which further threatens the personality development of children. The findings indicate that digital technology is beneficial for children's academics if used as a learning tool. However, it can also become a source of distraction from studies if not properly moderated. Similarly, technology can be a means to connect families but enjoying quality time in a screen-free environment creates stronger and healthier interpersonal relationships in a family.

5. Recommendations of the Study

A longitudinal study on the current topic would enable us to understand the benefits and risks of digital technology on cognitive development in a better way. Moreover, a mixed-method research design can be applied to this research topic to evaluate the effects of digital technology quantitatively. Furthermore, the role of technology in the development of attachment between a mother and a child must be studied more thoroughly. Lastly, the

perspective of working mothers must be taken into consideration as well.

References

Aiken, M. (2017). *The cyber effect: A pioneering cyberpsychologist explains how human   behavior changes online.* London: John Murray.

Al-Bataineh, A., Harris, J. L., & Al-Bataineh, M. T. (2016). One-to-one technology and its effect   on   student   academic achievement and motivation. *Contemporary Educational Technology, 7*(4). doi:10.30935/cedtech/6182

Barr, R., & Lerner, C. (2014). Screen sense: Setting the record straight. Research-based guidelines for screen use for children under 3 Years old. Zero to Three.

Birken, C. S., Maguire, J., Mekky, M., Manlhiot, C., Beck, C. E., DeGroot, J., Parkin, P. C. (2012). Office-Based Randomized Controlled Trial to Reduce Screen Time in Preschool   Children. *PEDIATRICS,*   *130*(6),   1110–1115. https://doi.org/10.1542/peds.2011-3088

Chaudron, S. (2015). *(PDF) Young Children (0-8) and digital technology: A qualitative exploratory   study   across   seven countries.*   ResearchGate.
   https://www.researchgate.net/publication/283398879_Young_Children_08_and_digital_t
   echnology_A_qualitative_exploratory_study_across_seven_countries.

Courtney, J. A., & Nowakowski-Sims, E. (2019). Technology's impact on the parent-infant   attachment   relationship: Intervening through FirstPlay® therapy. *International Journal of   Play   Therapy,   28*(2),   57–68. https://doi.org/10.1037/pla0000090

Gottschalk, F. (2019). Impacts of technology use on children. *OECD Education Working Papers*. doi:10.1787/8296464e-en

Guo, R. X. (2017). CRI Project Report: The Impact of Technology on Attachment and Social Skills. .*NYS Child Welfare/ Child Protective Services Training Institute.*, *11*. https://doi.org/http://digitalcommons.buffalostate.edu/cwcpstriaininginstitute

Heidelberg. (2018, June 13). Digital devices during family time could exacerbate bad behavior. Retrieved May 02, 2021, from https://www.springer.com/gp/about-springer/media/research-news/all-english-research-news/digital-devices-during-family- time-could-exacerbate-bad-behavior/15838792

Johnson, G. (2006). Internet Use and Cognitive Development: A Theoretical Framework. *E- Learning and Digital Media*, *3*(4), 565–573. https://doi.org/10.2304/elea.2006.3.4.565

Kirkorian, H. L., Pempek, T. A., Murphy, L. A., Schmidt, M. E., & Anderson, D. R. (2009). The impact of BACKGROUND television on parent-child interaction. *Child Development, 80*(5), 1350-1359. doi:10.1111/j.1467-8624.2009.01337.x

Lloyd, J., Dean, L. A., & Cooper, D. L. (2007). Students' technology use and its effects on peer relationships, academic involvement, and healthy lifestyles. *Journal of Student Affairs Research and Practice, 44*(3). doi:10.2202/1949-6605.1832

McDaniel, B. T., & Radesky, J. S. (2018). Technoference: Longitudinal associations between parent technology use, parenting stress, and child behavior problems. *Pediatric Research, 84*(2), 210-218. doi:10.1038/s41390-018-0052-6

Mcleod, S. (1970, January 1). *Bowlby's Attachment Theory*. John Bowlby | Maternal Deprivation Theory | Simply Psychology. https://www.simplypsychology.org/bowlby.html.

McLeod, S. (2018). *Lev Vygotsky's Sociocultural Theory.pdf - Lev Vygotsky By Saul McLeod   updated 2018 The work of Lev Vygotsky(1934 has become the foundation of much: Course Hero*. Lev Vygotsky's Sociocultural Theory.pdf - Lev Vygotsky By Saul McLeod   updated 2018 The work of Lev Vygotsky(1934 has become the foundation of much | Course Hero.   https://www.coursehero.com/file/74364353/Lev- Vygotskys-Sociocultural- Theorypdf/.

Nadirah, I. (2015, January 31). Smartphones, tablets make bad babysitters, parents told.   Retrieved May 02, 2021, from   https://www.malaymail.com/news/malaysia/2015/01/31/sm artphones-tablets-make-bad-   babysitters-parents-told/831185

Subrahmanyam, K., Greenfield, P., Kraut, R., & Gross, E. (2001). The impact of computer use   on children's and adolescents' development. *Journal of Applied Developmental   Psychology*, 22(1), 7–30. https://doi.org/10.1016/s0193-3973(00)00063-0

Tadpatrikar, A., Sharma, M. K., & Viswanath, S. S. (2021). Influence of technology usage on family   communication   patterns   and   functioning: A systematic review. *Asian Journal of Psychiatry, 58,* 102595. doi:10.1016/j.ajp.2021.102595

Wartella, E., Rideout, V., Lauricella, A. R., & Connell, S. L. (2014, June). Revised parenting in   the   age   of   digital   technology. Retrieved   May   2,   2021,   from   https://cmhd.northwestern.edu/wp- content/uploads/2015/06/ParentingAgeDigitalTechnology.RE VISED.FINAL_.2014.pdf

Weathersbee, J. C. (2008). Impact of technology integration on academic performance of Texas   school children. Retrieved May   02,   2021,   from   https://www.academia.edu/1195646/Impact_of_Technology_

Integration_on_Academic_

Performance_of_Texas_School_Children

Wentworth, D. K., & Middleton, J. H. (2014). Technology use and academic performance. *Computers & Education, 78*, 306-311. doi:10.1016/j.compedu.2014.06.012

Yesilyurt, M. E., Basturk, R., Yesilyurt, F., & Kara, I. (2014). The effect of technological   devices on student's academic success: Evidence from Denizli. *Journal of Internet   Applications   and Management, 5*(1), 39-47. doi:10.5505/iuyd.2014.83007.