

Is technology destructive for adolescents' development?

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There was a time, back in the early 19th century to the early 2000s, where people everywhere would reach for a cigarette in an anxious moment. This hack for relief was used when a problem arose, such as waiting for someone, boredom, driving, or partying. This conversational dispute formed back when people had limited access to technology. In today's world, people in situations like those listed simply reach for their phones instead and tune out the world. The comparison of phones to cigarettes is uncanny, both can be used in conversation, but both can also harm development. A statistic from 2021 states that 11% of high schoolers and 3% of middle schoolers use e-cigarettes in the United States (U.S.) (Dellatto, 2021) compared to the 95% of adolescents who have smartphones in the U.S. (O'Dea, 2020). This high-rate usage of technology made me ponder about how adolescents today are over-using this telecommunication. From this my question was formed, is technology destructive for adolescents' development? I saw with the advancements of technology that adolescents have been disconnected from society - catching this made me wonder how technology has affected adolescents on a cognitive and educational level. As an adolescent myself, I always thought that although technology is fun with its connective apps and beneficial educational programs, that technology is purely harmful toward our development. The introduction of technology is due to the evolution of society as seen in classrooms, is and is not destructive, and exposing the mental effects, is and is not destructive, of technology for adolescents in places like the United States, South-Eastern Europe, South-Eastern Asia, the United Kingdom, and Central Europe. For the use of this paper, adolescents will be defined as "the period of transition between childhood and adulthood" (Allen & Waterman, 2019), referring to children from ages 5-20 in general or will be asserted for specific research. Technology will be defined as a "portable digital device" or "information and communications technology (ICTs)." (StackExchange, 2015).

Although Steven Sloman has authored many articles on financial themes (Sloman, 2021), and has no further research studies published (Sloman, 2021), Sloman has a psychology degree from Stanford University (Sloman, 2021), Sloman, since 1992, has currently been teaching cognitive thinking at Brown University (Sloman, 2021) and Sloman also was the Editor-in-Chief of Cognition: The International Journal of Cognitive Science (Sloman, 2021); meaning that not only has Sloman studied, researched, and taught cognitive science, but also participated in a global outlet on the topic of cognitive abilities. Classifying the validity of Sloman, it can be shown that although he limited publications, Sloman has years of experience in the realm of cognitive thinking.

Even though Phillip Fernbach is a professor of marketing in the Leeds School of Business at the University of Colorado (Fernbach, 2021), and is the co-director of the Center for Research on Consumer Financial Decision Making (Fernbach, 2021), Fernbach does have a Doctor of Philosophy degree in cognitive science (Fernbach, 2021). From this Fernbach studied at the Department of Cognitive, Linguistic and Psychological Science at Brown University, and he frequently speaks on his research to sources such as New York Times and others (Fernbach, 2021). Ergo Fernbach has a considerable amount of experience through his education and research opportunities. Weighing the expertise of Fernbach, one can evaluate the validity of his work by his multiple degrees in cognitive thinking.

Granted *The Common Sense Census: Inside the 21st-Century Classroom* was fabricated in the United States leaving out worldly views (Vega & Robb, 2019), and spoke from a teachers perspective rather than a student's (Vega & Robb, 2019), this study can also show that this Census speaks on a wide range of ages on students behalf's (Vega & Robb, 2019), implies the improvement or decline of education of adolescents from a teacher's perspective (Vega & Robb,

2019), and also shows statistical data evaluating every detail (Vega & Robb, 2019). This foreshadows the potential usefulness of a study participating in quantitative data and describing the use of technology in the educational field. Rating the validity of this study, one can presume that it would be of use through its numerical data collected throughout the United States and range of adolescents being spoken about.

When validating the study *Pre-service teachers' concerns about social robots in the classroom: A model for development*, although it is unclear as to how the participants were found from the hundreds of schools to be chosen from (Starcic & Rosanda & Bratko, 2021), and there was no sign of consent from the participants nor parents which is necessary hence them being significantly underage (Starcic & Rosanda & Bratko, 2021), there is documentation of legal regulations tasked with the study (Starcic & Rosanda & Bratko, 2021), the study disclaims possible psychological development harm toward the child from the robots (Starcic & Rosanda & Bratko, 2021), and provides paper confidentiality of the subjects but while showing video proof of the study being conducted (Starcic & Rosanda & Bratko, 2021). This poses the information that this study provides a safely conducted experiment that was to help see the effects of technology in a classroom setting with younger adolescents. Assessing the study, it is invaluable to see the benefits the study produced with new research of technology affecting adolescents' development.

“As technology becomes more sophisticated, we will become even more ignorant about what's under the hood.” (Sloman & Fernbach, 2017). Technology today has begun destroying our ability to do simple tasks not only in society but in adolescents' education. “We will depend even more on experts to keep it all up and running.” (Sloman & Fernbach, 2017) and we will lose sight of our own education. With nearly 95% of all teachers in the United States (U.S.) using

some form of technology in classrooms (Vega & Robb, 2019), this highlights that adolescent's education has now begun to wrap-around the industry of technology and is losing sight of the traditional paper and pencil. "Children are increasingly finding it hard to hold pens and pencils because of an excessive use of technology, senior pediatric doctors have warned." (Hill, 2018). This inability to hold a pencil can be worrisome because many examinations for students still require one to handwrite on paper. With some limitations of students' access to technology arise in school systems, educators also see the effects. From the 2019 Educator Census conducted in the U.S., gives reports on the use of technology not only in classrooms but also at home for students. The study claims that in "Title 1" schools, or schools of predominantly students of color, state that "61 percent to 100 percent" of students did not have access to the internet or a computer at home (Vega & Robb, 2019). Comparing this to mixed schools or predominantly white schools ("non-Title 1 schools") which has a significantly lower rate of 26 to 27 percent of students having limited access to the internet or a computer (Vega & Robb, 2019). This displays that by technology being integrated into classrooms, adolescents have been suffering the consequences of their inability to perform simple tasks and are restricted and behind with the lack of access to such resources. Allowing for the shifting changes in adolescents' lives from paper and pencils to portable digital devices, has ruined any form of independent learning through the lack of resources to excel in an academic setting.

Adolescents today are being challenged in the classroom by who the instructor is and what they are presenting. A Slovak study tells the use of an AI (Artificial Intelligence) or a robot teacher in a classroom. The study reports from an educators' perspective, with this unique idea of incorporating this technology into classrooms, shows the negatives of this technology. Robots should not replace the teacher, especially in a kindergarten classroom where the children will be

interested in the beginning, but this will soon backfire because the students will not listen to the robot for a prolonged period of time. The students “will be more interested in its structure and everything else, rather than sitting and listening to what he is saying.” (Starcic & Rosanda & Bratko, 2021).

This justification shows that finding clever ways to cheat out an easier education system is not beneficial to the students due to the lack of learning being presented to them.

If children were to spend too much time with robots, they could take those children away from the realm of human relationships, because as they grow up, they’d be constantly looking for some contact with tech and maybe putting it ahead of interpersonal relationships. (Starcic & Rosanda & Bratko, 2021).

With the efficiency of the learning process of adolescents at stake, one can presume that encouraging this disruption would harm the learning capacity of adolescents from any age. With the discussion robots lack emotional intelligence, this “could result in... a child lacking appropriate emotional development and emotional intelligence...” (Starcic & Rosanda & Bratko, 2021). Reasoning with judgement, the integration of technology, specifically AI in this case, would not only distract adolescents from the true intentions of the program, but also harm their cognitive learning development, tainting their future. Weighing this responsibility of a proper education, adolescents’ containment of a true teacher is valuable to their learning development of the future.

Although Stephane Chaudron works on multiple publications at a time (Chaudron, 2015), and Chaudron specializes in the making of technologies such as the data, coding and structure of the machinery (Chaudron, 2015); however, Chaudron works with the Joint research Center of the European Commission since 2013 (Chaudron, 2015), she is dedicated to Empowering Children

Rights and Safety in emerging information and communication technologies (Chaudron, 2015), and Chaudron speaks on multiple platforms to parents and other researchers on the benefits of technology on adolescents (Chaudron, 2015). Inspecting the validity of Chaudron, one can see that through her extensive research in child psychology and technology development. Assessing Chaudron, she has extensive expertise on the positive effects of technology on adolescents through her multiple outlets of publications, even though she works on multiple at a time – each publication never is inefficient to others.

Although Becky Farrin has a bachelor's degree in Communications (Farrin & Bergman, 2021), and is a licensed realtor (Farrin, 2021), but she did study a minor in Family and Human Development (Farrin & Bergman, 2021), and she is currently pursuing a master's degree in Mental Health Counseling (Farrin & Bergman, 2021), she has participated in many activities and publications on being a mental health advocate for children and families (Farrin & Bergman, 2021). This infers that Farrin is valid through her education on topics that relate to adolescents' development and participating in many projects to better their care. Viewing Farrin's' validity, it can be seen that she has extensive work in bettering her knowledge of family and childcare showing her to be viable for this paper.

Validating Melody Bergman, although she has a Bachelor's in communications (Farrin & Bergman, 2021), and no other publications (Farrin & Bergman, 2021). However, Bergman is the co-founder of SACTrafficking.org (Farrin & Bergman, 2021), creator of MamaCrossroads.com which is a blog that provides parenting tips (Farrin & Bergman, 2021) and is actively fighting for children's rights regarding education in her community (Farrin & Bergman, 2021). This demonstrates Bergman's usefulness to provide information on the positives of technology in

adolescents' lives. Weighing the importance of Bergman, one can see that through her work and research in parenting and activeness in child education, she contains value.

Technology is not entirely destructive from an educational point of view; some experts will argue. Many educational apps have been developed and used throughout the past decade, including that...

Technology allows kids to access a variety of learning materials involving everything from letters and numbers to states, spelling and learning new languages. Some sites, like k12.com, even allow kids to attend online school. (Farrin & Bergman, 2021).

Examining this new generation of apps to enforce education, adolescents are beginning to thrive in the education arena. The variety of apps that help adolescents learn in a new way from the average memorization skills through advanced learning in all subjects; this helps adolescents focus on their strengths as well as learning where additional help and support is needed.

Along with the apps guiding the students to accomplish their goals, help has been introduced in new forms, such as online libraries. In this new day and age, books are being placed online for easy access to students, in both the school and county libraries. Now students have the ability to access online, rather than carrying many textbooks or having to return them to the library. This also allows the technology resources at home to compete with the school systems like, the “online libraries for kids make it possible for parents and their children to read eBooks and access a variety of kid-friendly resources for free. Most schools promote and encourage students to... read their textbooks from the school’s website.” (Farrin & Bergman, 2021). Examining this information, technology has made an educational presence for both adolescents and adults. With the resulting decision to place educational resources online, it has created a beneficial community for adolescents in the learning environment.

The advancements of technology have been extremely beneficial with the aid of adolescents with special needs. The ability to learn along with the application on a screen has been found to help special needs adolescents focus on specific goals. “Children with special needs and other disabilities can especially benefit from apps and tech-based devices because they help improve communication skills and change how the kids interact with others.” (Farrin & Bergman, 2021). Within the digital space, parents and teachers can focus on specific apps and subjects to help adolescents’ development, which is tied to their own learning abilities – whether they are challenged in the classroom or not. This implies that the digital media of technology is keen to assist any adolescent, no matter the developmental skills present - and aim to help the child grow. Weighing the benefits of technology on adolescent development, one can infer that most adolescents are thriving in classrooms from the help that technology has provided.

With all this new power to explore the internet, parents and teachers are modeling healthy behaviors and uses toward technology. Children are in constant contact with a wide range of digital tools that have multiple uses. But in the education field, teachers are the primary subjects that aid adolescents' development through technology.

Among teachers who used any type of digital citizenship curriculum in their classrooms, approximately half (52 percent) said it was “extremely” or “very” effective in helping students make smart, safe, and ethical decisions online. (Vega & Robb, 2019).

Having 51% of teachers who use technology for their supplemental apps or websites, 48% use technology for their learning and management systems and 29% use it for communication learning, (Vega & Robb, 2019) provides evidence that education systems are improving their tactics of evolving to the new age of adolescents' development. This programing in school systems has seen an increase in “creativity, imagination, social skills, knowledge acquisition,

hand-eye coordination and educational provision for future.” (Chaudron, 2015). This poses the actuality that teachers are aiding toward pursuing newfound developmental skills for today's adolescents. Appraising the dedication of educators towards an increase in education, adolescents' use of technology has strongly helped their development.

When comparing the destructiveness of technology toward adolescents' development, regarding the ‘is destructive’ argument – experts like Sloman, Fernbach, Vega and Robb of the 2019 Teacher Census, and the study *Pre-service teachers' concerns about social robots in the classroom: A model for development*, claimed that through the constant use of technology in our education systems, adolescents are losing basic human skills such as lack of communication, focus and the inability to even hold a pencil. From this integration of technology in schools, this is making many lessons and homework assignments needing to be done online which is harming the students who do not have access to such technology. However, the ‘is not destructive’ argument experts Chaudron, Farrin, and Bergman would argue that students have way more access to technology through classrooms and libraries, but also technology has allowed for an immense improvement in educational programs and apps produced online. These new forms of learning have improved students' development through cognitive challenged games and online lessons.

Looking at the evidence in the study, *The Negative Effects of Digital Technology Usage on Children's Development and Health*, it uses statistics from the early 2000s which could result in old data (Mustafaogla et. al, 2018), and while the study doesn't contribute too many writings (Mustafaogla et. al, 2018); *The Negative Effects of Digital Technology Usage on Children's Development and Health* focuses on children (Mustafaogla et. al, 2018), they talk about a wide range of technological devices and their effects on adolescents (Mustafaogla et. al, 2018), and

they discuss more than just mental effects but also health effects to the body (Mustafaoglu et. al, 2018). Examining the study, cast by their wide range of technological devices and effects on adolescents, it can be trusted. Deciding to validate the study, although it uses older references and data – they do discuss helpful material through the use of technology and how it negatively impacts adolescents.

“In a study on children aged 4-11 years, it was found that 37% of the children had a low active play level, 65% had high screening time, and 26% had a combination of these two.” (Mustafaoglu, et. al, 2018). With the statistical data on the prominent level of screentime, one can imagine the mental effects happening to these adolescents. Mental health is a new topic that is involved in every situation, including when it comes to children. With the increase of screen time, one must suspect what is causing this spike. Social media is an unnatural phenomenon that became increasingly popular when “Its use by teenagers increased most quickly between 2009 and 2011, by which point two-thirds of 15–17-year-olds were using it on a daily basis.” (Haidt & Allen, 2020). Teenaged adolescents have been the number one victim of mental-health problems, especially with the influence of technology constructing social media. Since the introduction of social media, Haidt & Allen (2020) stated “A sudden increase in the rates of depression, anxiety and self-harm was seen in adolescents... in the [U.S.] and the [UK] around 2012-2013.”, proving that adolescents are spiraling with this new format of technology. Tracing younger adolescents, the influence of home technology has caused major development issues, an example argues...

Similar to television, computers have become an indispensable element in children’s lives.

Spending too much time on the computer from an early age can negatively affect academic success due to the low concentration, lack of attention and disorganization, undeveloped language

skills, creativity, and imagination seen in children as a result of excess computer use. (Mustafaoglu, et. al, 2018).

The impact of technology on young adolescents' brains is evident and could affect them for the rest of their lives. This can truly be seen in younger children who do not have the capability of proper interaction between other children and adults; they do not have the ability to look someone in the eyes and have a complete conversation with them because of the lack of focus. Ergo adolescents, seemingly obvious effects, from digital media have been prominent in the negative mental effects being exhibited with the influence of technology. When viewing the deterioration in the mental health of adolescents it starts to be a key factor in determining the cause of the developmental damage from technological influence.

Furthering into studies on how technology is destroying adolescents' mental development, Microsoft conducted research that found since the year 2000, the average attention span dropped from twelve to eight seconds, compared to a goldfish which has an attention span of nine seconds (Murphy, 2020). This decrease in attention span has made concentration on school projects, classes, or conversations more difficult. Subsequently proving that adolescents' mental health has been chipped away through the introduction of technology, in the form of school or play. This decrease in attention span is a result of social media with its ruthless algorithms that warp the minds of young individuals. The programmers of social media platforms like TikTok or Instagram purposefully made the "infinite scroll," the design principle that enables users to continuously scroll through their feeds, without ever having to decide whether to keep going..." (Freitag, 2021) successfully trapping their users into watching more advertisements and blocking reality. This cyber-reality, with its infinite scroll, has created an entire conglomerate to gain users – but the creative engineering of this feature took a turn. The

digital loneliness epidemic formed with the rising rates of social media users – and the rates of depression and loneliness as it relates to social media usage (Freitag, 2021). With 4.48 billion people worldwide who use social media, the endless amounts of content create the infinite scroll, which effects the users on a daily basis that traps them into following the media platforms instead of dealing with the day-to-day aspects of daily life.

It's not just rural areas that urgently need mental health services: we have staggering mental health problems in this country, and particularly in the young. As many as one in five children in the United States have behavioral health issues, but only 20% of those who need mental health services actually receive them. And of that 20%, about half and treatment prematurely because of access, transportation, or money issues. The problems continue: about 20% of adults, or 43 million people, are affected by mental illness every year, and most receive no treatment whatsoever. The main barriers are stigma and cost. (Crawford, 2021).

Susan Crawford has years of experience in the field of law (Crawford, 2021) and has worked in politics for many years (Crawford, 2021), however Crawford served as Special Assistant to the President for Science, Technology, and Innovation Policy in 2009 (Crawford, 2021). Crawford has won multiple awards through her advancements in research on the use of technology in society (Crawford, 2021), and has published multiple books on the age of technology affecting society (Crawford, 2021). Reasoning with the information on Susan Crawford, she has extensive knowledge of the effects of technology on society and speaks on the effects of adolescents. Weighing the positives and negatives of Susan Crawford, although she has experience in the field of politics, Crawford does have years of work in the field of writing on the use of technology.

Technology today is creating new forms of help services for people who are unable to get proper care which is seeing that technology is not destructive to adolescents' mental development. Telehealth, being one of the new forms, is defined as the use of electronic and telecommunications technologies that support public health with professional help (*What is telehealth? How is telehealth different from telemedicine?*, 2019). Telehealth is a tool that is used to contact psychiatric care (therapists) and speak to them via videoconference on any device that holds such data. This new tool has...

A great deal of evidence [that] shows that [patients] are happy to avoid transporting themselves to and from appointments, and that they feel comfortable disclosing the same kind of information they would disclose in a face-to-face session. Parents seeking help for their children are especially pleased with the telepsychiatry, because their kids are comfortable with screens, and they are happy not to have to force a trip to an office that may be frightened with the stigma for their child. (Crawford, 2021).

Adolescents' mental health is being considered and is being formed in ways that they feel comfortable dealing with this newfound struggle. "Students at schools connected to fiber can stay at school while meeting with a therapist," while hospital clinics and emergency rooms "can make therapists available to patients with mental health crisis." (Crawford, 2021). This displays that the technological benefits of Telehealth have subsequently improved in adolescents' mental development through easy resources to speak to specialists. Gauging the effectiveness of this new treatment in the form of technology, adolescents are having support systems and outlets to release their stresses.

When seeing how technology can help adolescents gain professional help for their mental development, technology can also help adolescents gain supportive relationships with family and friends through technology.

With the ability to video chat with family and friends, children as young as two can recognize grandparents and other family members, sing songs together, read bedtime stories or share in family events... Allowing connections and memories to be made with loved ones from hundreds of miles away... (Farrin & Bergman, 2021).

This line of communication through the advancements of technology has also helped strangers connect with those alike all around the world. “73% of respondents typically maintain interpersonal relationships via technology, including engaging with others on social media.” (Freitag, 2021). All in all, adolescents having the support of their family and friends can help lower mental issues by just being able to communicate via technology. Classifying the information, adolescents are proving that technology is helping their mental development through connections made online with both family and connections with others that have similar ideologies.

Other aids toward adolescents' mental development have been successfully created and implemented into lives prior to the destruction of adolescent mental state. Movements such as the “Seize the Awkward campaign” produced by Ad Council in May 2020 was the new creation of highlighting young people could use digital communications as tools to stay connected and checking on one another's mental health while practicing social distancing from the Covid-19 Pandemic (Freitag, 2021). Within the next year, “Sound It Out” was released by Ad Council, “which harnesses the power of music to speak to 10-14-year-olds' emotional wellbeing.” (Freitag, 2021). With the effectiveness of spreading awareness on adolescents' mental health,

programs are using technology and social media has its tools in order to help adolescents stay connected and help others.

When comparing the uses of technology toward adolescents' development, revisiting the 'is destructive' argument – experts, like the study *The Negative Effects of Digital Technology Usage on Children's Development and Health*, claim that depression, anxiety, and stress levels have increased through the constant use of technology and social media has played a huge role in this; even damaging adolescents' creativity, concentration, and other development issues. However, the 'is not destructive' argument by Crawford and the Ad Council would argue that more resources to aid mental development of adolescents' have been formed, like Telehealth, to provide help for those with troubles. And have seen more communications with families and friends form long distance relationships creating a supportive team for adolescents' mental development. The ever-changing world of technology has impacted adolescents' mental development controversy, but technology continues to be constantly used throughout the lives of our youth.

With this new era of the world that we live in, technology has become the newfound power of humanity, and we intend to keep pursuing it into our everyday life. Is technology destructive for adolescents' development? - was the question I intended to answer with the views of educational health and mental health being affected by this form of telecommunication. When reviewing the information as it unfolded, technology has tended to impact adolescents on a more negative scale than positive - through education it has stunted learning capacities, and through mental health, technology has increased rates of depression, and anxiety struggles.

Through my research, I have encountered endless amounts of qualitative and quantitative data that would argue along both sides of the question. Deciding on the lenses for this question

required no hesitation because of the two main factors that control the lives of adolescents - school and their minds. Through education, I wanted to perceive how adults like teachers and parents are using this tool to help adolescents learn through apps or easy to use resources - but I also wanted to see the opposite side claiming the stunting of creativity, communication, and focusing on adolescents. While through mental health I wanted to establish what resources have been created to help adolescents through their struggles, but also find statistical data on what harm technology has done. Resources such as Khan Academy, K12, and ABCmouse have been established as great educational tools to help adolescents through their studies, while Telehealth resources provided by private firms or government insurance have been a huge factor that facilitates mental health struggles in adolescents.

Ultimately, this integration of technology into the lives of adolescents has become a common thread in today's world. This technology can be addictive like a cigarette, or it can be a useful tool to aid and increase cognitive abilities. Choosing whether to use helpful tools or apps to increase the adolescent's growth in education and wellbeing or spiraling mental disorders - the technology is still present. It has become a quantitative question for both parents, teachers, and adolescents. Although I want to say it seems that the answer is both...depending on if the technology is monitored, adolescents have free-range to explore the vastness of technology, again concreting whether this is positive or negative toward the development of adolescents; a verdict must be made that technology is destructive for adolescents' development. This can solely be determined by the vastness of information on the decreasing cognitive minds of adolescents through the constant use of digital devices. Conclusively, technology has impacted society in many systems. Adolescents are developing into the new main users of this epidemic, solidifying the fact that technology is here to stay. Reshaping this advancement to primarily

benefit adolescents would be a renowned achievement toward the development of adolescents. I hope to see this future where the bugs of technology are obliterated and in doing so, it creates this helpful machinery that will be able to guide and transform the youth of this world.

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