

IMPACTS OF EXCESSIVE USE OF TECHNOLOGY ON TRADITIONAL SKILLS: AN ANALYSIS OF COGNITIVE AND BEHAVIORAL RISKS AND CONSEQUENCES

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Abstract: *The use of digital technology has become pervasive in contemporary society, fundamentally affecting the way people communicate, learn, and think. This article analyzes the risks associated with technology overuse, including those related to mental health, social relationships and academic performance, and examines its negative effects on essential traditional skills such as handwriting, deep reading, and critical thinking. It provides a systematic literature review that integrates data from recent research in cognitive psychology and educational science. Conclusions emphasize the need to balance the use of technology with the development of basic skills, and solutions are proposed to mitigate the negative effects of excessive technology use.*

Keywords: technology overreliance, traditional skills, writing, reading, critical thinking, digital literacy

1. Introduction

The advent of technology has revolutionized many aspects of human life, including education, communication, and work. However, this technological advancement has also raised concerns about its impact on traditional skills such as writing, reading, and critical thinking. This response examines the negative effects of overreliance on technology, focusing on these traditional skills and the risks associated with them.

Technology has become not only a functional tool, but an essential component of social identity and everyday activities. However, excessive and uncontrolled use of digital devices has been associated with a number of negative effects on mental health and cognitive development. Recent studies show that constant exposure to technology can lead to a decline in traditional skills such as active memory, critical thinking, and sustained

attention [1]. Moreover, digital overdependence affects young people in particular, who are exposed to a ubiquitous digital environment from an early age. Generations born after 1995 (the so-called “iGen”) show an alarming increase in symptoms of anxiety, depression and social isolation, in close correlation with the heavy use of social networks and smartphones [2]. In this context, a critical analysis of the balance between technological benefits and their negative impact on basic human competencies is essential to prevent the erosion of essential social and professional skills.

Technology dependence is defined as a form of addictive behavior characterized by compulsive and excessive use of digital devices, especially smartphones, social networks, and the Internet, to the detriment of normal social, academic, or occupational functioning. This form of addiction has similar

characteristics to other types of behavioral addictions, including tolerance, withdrawal, and loss of control [3]. Although not yet formally classified in all diagnostic systems (such as DSM-5), specialized literature clearly highlights the clinical manifestations associated with this condition: lack of concentration, decreased motivation, irritability when deprived of technology, and withdrawal from offline activities. These manifestations can have a long-term impact on mental health, interpersonal relationships, and cognitive development, requiring specific interventions and a rethinking of the way in which technology is integrated into daily life [2, 3].

Of course, technology also has a positive impact on the academic environment. Artificial intelligence helps solve problems and analyze data, facilitates complex information processing, collaboration, and the generation of well-reasoned ideas.

In addition, the broad accessibility and adaptability of learning through online platforms allows pace and style to be tailored to students' individual needs, encouraging deeper exploration of topics. Finally, emerging digital tools, such as VR and AR, foster creativity and innovation, offering interactive learning experiences that promote deeper understanding and innovative thinking.

Overreliance on technology in the academic environment also has a significant negative impact on students' cognitive development. Frequent use of digital tools leads to a decline in cognitive performance. Constant exposure to digital information can lead to information overload, resulting in losing the ability to concentrate or thoroughly analyze issues. Social media also contributes to the fragmentation of attention and limits the development of complex cognitive skills. In addition, overreliance on technology reduces students' ability to solve problems without external assistance, which affects intellectual autonomy.

2. Research Methodology

This article was developed using the desk research method, specific to qualitative research in the social and human sciences. This approach allowed reviewing, selecting, and critically interpreting the relevant scientific literature published in the last decade, to identify explanatory models, correlations, and trends regarding technological overdependence and its effects on traditional skills and psychosocial health. The research is exploratory-descriptive, aiming to clarify the concept of technology addiction, identify effects on cognitive functions (writing, reading, critical thinking), and analyze associated psychosocial risks. The objectives of this paper are to analyze the impact of technology overuse on traditional skills such as writing, reading, and critical thinking; to explore the psychological, social, and educational risks associated with overuse; and to propose solutions for an optimal balance between digital and analog space in the academic environment.

3. Negative Impact of Technology on Traditional Skills

3.1. Lack of Critical Thinking

Technology-induced changes in educational processes have led to a profound reshaping of cognitive skills, particularly critical thinking and analytical skills. Research has shown that while constant exposure to digital environments stimulates the development of visual-spatial skills, it has an inversely proportional effect on reflective thinking and the ability to analyze in depth [4]. In this sense, technology influences not only the way information is processed, but also the structure of thinking, presenting fragmented content that discourages sustained interaction with complex ideas. In an increasingly technologized operational and social context, culture and education become strategic tools, and the inability to think critically can turn individuals into passive recipients, vulnerable to external informational influences [5]. Therefore,

academia has a responsibility to consider both new technologies and traditional educational methods to avoid the risk of turning students into mere information consumers, lacking analytical discernment and intellectual autonomy. Professor Patricia Greenfield's analysis of more than 50 studies on learning and technology supports this observation. Her work emphasizes that the constant use of computers, the Internet, and video games has led to a shift in cognitive processing that favors visual-spatial skills over critical thinking and analysis [4]. This shift is of particular concern in educational settings, where the ability to analyze and evaluate information is necessary for academic success. Mitigating this decline requires equity between the use of new media and traditional learning methods. Universities should encourage students to use a variety of media and ensure that they have opportunities to develop both visual and analytical skills [4].

3.2. Erosion of Writing Skills

Writing skills have also been profoundly affected by the spread of digital technology. While technology has made writing on the keyboard more accessible and efficient, it has also resulted in decreased quality and depth of writing. Increased reliance on digital tools for writing has led to a shift away from traditional handwriting, which has been shown to have cognitive and educational benefits [6]. Research suggests that reduced exposure to handwriting due to the prevalence of digital devices may weaken intellectual processes such as memorization and information processing [6]. Handwriting has been shown to enhance an individual's cognitive development because it requires the coordination of multiple motor and cognitive skills. If individuals are not given sufficient opportunities to practice handwriting, their fine motor skills and overall dexterity may suffer [6]. In addition, the transition from handwriting to digital typing has an impact on the legibility and

speed of writing. Studies have shown that both children and adults may experience a decrease in handwriting quality and speed when switching from handwriting to digital formats [6]. This suggests that while technology may offer some advantages in terms of speed and convenience, it may also undermine the development of essential writing skills.

To address these challenges, teachers and policymakers must consider the importance of maintaining traditional writing skills in the digital age. This can be accomplished by incorporating both digital and traditional writing practices into educational programs to ensure that students develop a balanced set of skills [6, 7].

3.3. Decline in Reading Skills

Overuse of technology has also been linked to a decline in reading skills. Constant exposure to digital media such as social media, text messaging, and online articles has led to a shift in reading habits. Rather than engaging in deep and sustained reading, many individuals prefer to quickly scan information, a practice often referred to as "surface reading" or "diagonal reading" [4, 8]. This change in reading habits has been shown to negatively impact reading comprehension and critical thinking skills. When individuals skim text, they are less likely to be engaged in active reading practices such as questioning, analyzing, and reflecting on the material [4]. As a result, their ability to comprehend and interpret complex text can be compromised. In addition, the constant distractions of digital devices can interfere with the ability to concentrate while reading. Research has shown that multitasking, which is often encouraged by digital media, can lead to a decline in reading performance and overall academic achievement [8]. Multitasking affects short-term memory by leaving individuals with so little disorganized information in their minds that they become tired and choose to exclude it, thereby activating forgetting. This suggests that, particularly in educational settings, the

excessive use of technology may have a detrimental effect on reading skills.

To combat this decline, it is important to maintain a balance between digital and traditional reading practices. Educational environments should encourage students to engage in both digital and print reading activities to ensure that they develop the necessary skills for deep and sustained reading [4, 8].

4. Risks of Technology Overuse

Excessive use of technology poses many risks, especially in education.

One of the main concerns is the potential for technology to dehumanize the educational environment. Increased reliance on digital tools has led to a shift away from face-to-face interactions, which are essential for social and emotional development [8]. In addition, face-to-face interactions are being replaced by virtual, digital communication, compromising empathy, emotional tone, and nonverbal understanding. Studies show that young people who spend more time online have difficulty maintaining authentic relationships [9]. This can have a negative impact on mental health, as social connections are necessary for emotional well-being [8].

Another risk associated with the overuse of technology is its potential to distort social interactions between teachers and students. Increased reliance on digital tools has led

to a shift in classroom dynamics, some teachers expressing their concern about the impact of technology on teacher-student relationships [8].

Avoiding critical thinking and problem-solving skills is a natural consequence of excessive reliance on technology. People become dependent on digital tools to the point that they can no longer complete tasks without them. Compulsive technology use has been shown to cause changes in the neural circuitry involved in reward and self-regulation, similar to what is seen in other types of addictions [3].

Students are reporting higher levels of digital stress and anxiety, as well as lower patience. Digital multitasking impairs concentration and cognitive efficiency. Students who constantly use devices while studying experience lower academic performance and reduced long-term retention [10]. This can lead to a decrease in cognitive skills as well as a lack of creativity and innovation [4, 8].

To mitigate the risks illustrated in Figure 1, it is essential to take a balanced approach to technology in education. Universities should ensure that digital tools complement, rather than replace, traditional teaching methods. This approach can foster both digital literacy and traditional skills, creating a more holistic learning environment [4, 8].

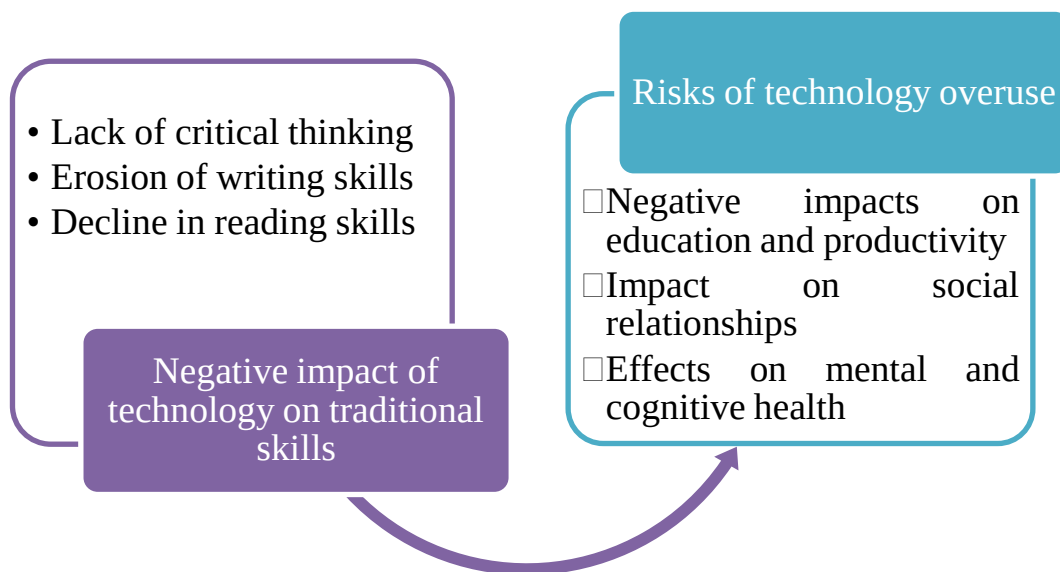


Figure 1: The negative impact of technology on traditional skills

Source: Author

5. Possible Solutions

Due to the complexity of technology overreliance and its multidimensional effects on individuals and society, it is necessary to establish strategic approaches to mitigate its negative impact. In this regard, three complementary lines of action are proposed (see Figure 2), based on research and empirically validated best practices.

5.1. Conscious Use of Technology

Effectively integrating technology into education requires combining digital tools with traditional teaching methods. Teachers should use technology as a tool to supplement activities that develop critical thinking, not as a substitute for them. AI tools can support learning but should not replace hands-on exercises. This blended approach fosters the development of both technical and cognitive skills. The goal is to promote the harmonious development of students through a balanced literacy approach.

An essential first step is to promote a well-balanced and mindful relationship with digital devices. Recent studies emphasize the importance of taking regular breaks from screens, not only for eye health, but

also for maintaining attention and preventing cognitive fatigue [11]. Similarly, reducing notifications, especially nonessential ones, significantly decreases hyperfractionation of attention, a phenomenon extensively documented by cognitive neuroscience authors [12, 13].

Encouraging active engagement in learning through strategies such as group discussions, debates, and problem-solving activities can help students develop critical thinking skills and reduce their reliance on digital tools.

For example, teachers can design tasks that engage students in collaborative problem-solving activities, independent of AI tools. Such activities foster a deeper understanding of the topic and encourage independent critical thinking.

Furthermore, the decline of critical thinking due to technology cannot be examined in isolation from the broader context of contemporary societal and cultural challenges. Ispas and Tudorache [14] emphasize the importance of cultural interoperability as the foundation of resilience in the face of hybrid threats. They highlight that cognitive adaptability and the ability to critically interpret reality

are essential in contexts marked by informational ambiguity and subtle manipulation. Thus, a decline in analytical thinking affects not only academic performance but also an individual's ability to actively and consciously participate in contemporary social and strategic processes. In an increasingly complex operational environment in which technology is used both as an educational tool and a vector of cultural and ideological influence, fostering critical thinking becomes a condition of cognitive security, not just an educational objective. Therefore, education must remain a space in which reflective competencies and discernment are systematically cultivated to strengthen individuals' resilience in the face of potentially disruptive information flows.

5.2. Development of Digital Literacy

To be sustainable, digital education must go beyond techno-centric approaches and cultivate critical and reflective thinking. In a society where exposure to information is constant and often unfiltered, building media literacy from an early age becomes imperative. According to a UNESCO report [15], integrating critical thinking into the digital curriculum positively impacts online discernment and reduces vulnerability to misinformation and algorithmic manipulation. Therefore, contemporary academia must facilitate not only the use of digital tools but also an understanding of the logic that governs them and their sociocultural implications. Digital literacy enables students to use technology effectively and critically. Teachers should incorporate digital literacy instruction into their curricula, teaching students to evaluate information sources, identify biases, and use digital tools responsibly. This training helps students avoid overreliance on technology while maximizing the benefits of digital tools.

Academia is facing a significant challenge due to the increasing use of artificial intelligence by students in their assignments, projects, and written work.

This trend raises issues related to the authenticity of the educational process, the originality of the content, and the development of cognitive skills. Uncritically using AI can lead to overdependence, which affects students' independent thinking and analytical skills. Therefore, academic institutions must urgently adapt their assessment strategies and promote a clear ethical framework for the use of technology in learning.

Artificial intelligence is characterized by increased flexibility and the ability to rapidly adapt to user requirements. However, this technological efficiency raises questions about the creative and logical autonomy of the individual. When essential cognitive functions are excessively delegated to automated systems, the risk is that independent thought will erode and humans will become mere executors of algorithm-generated decisions. Artificial intelligence can simulate human emotions, through programmed facial expressions, but this reproduction of affectivity remains superficial. It does not involve a genuine emotional experience. Thus, while the artificial can imitate the natural, it cannot replicate its essence. In this context, the human mind risks being marginalized as a genuine creative force, and individuals may lose touch with their own reflective capacities, becoming dysfunctionally dependent on technology.

5.3. Reassessment of Traditional Skills

In an era of accelerating digitization in education, rebalancing the intellectual formation process requires integrating emerging technologies and reassessing traditional skills, such as handwriting, critical thinking, and deep reading. Though often marginalized in current pedagogical discourse, these skills remain essential for cognitive development and the formation of an academic mindset.

Handwriting is a form of expression and a cognitive tool. Research shows that the physical act of writing activates brain areas

associated with memory, attention, and semantic processing [16], providing a more effective framework for learning than typing does. In academia, a practical way to reintroduce this skill is to encourage writing notes and essay outlines by hand as part of the prewriting process before final digital writing. Periodically assessing handwritten seminar notebooks can reinforce both the learned content and the coherence of ideas. Deep reading, a traditional skill affected by the hypertextuality of the digital environment, is essential for critically analyzing and complex understanding text. According to Wolf [17], reading physical media stimulates the neural networks involved in empathy, contextual understanding, and critical thinking – aspects diminished in rapid digital reading. Academic institutions can address this issue by introducing “slow reading labs”, where students are encouraged to engage with classic or scholarly texts through guided

analytical reading, followed by debate and written reflection.

When it comes to critical thinking, the digital age is a paradox: although it is full of information, it does not necessarily encourage its evaluation. To counteract this effect, seminars should be included to focus on analyzing sources, fact-checking, and identifying cognitive and rhetorical biases. For example, using the Socratic method in debates about different fields of study, along with analyzing real-life examples, helps people develop logical thinking and the ability to understand knowledge [18].

Therefore, the reintegration of traditional skills does not imply an opposition to digitization, but rather a balanced complementarity. In this sense, revaluing handwriting, deep reading, and critical thinking provides a solid framework for cultivating reflective, critical, and creative intelligence, a necessary skill in contemporary society.

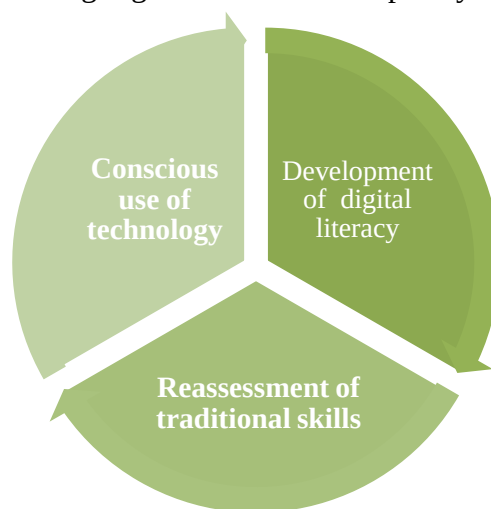


Figure 2: Possible solutions to mitigate the negative impact of excessive technology use
Source: Author

6. Conclusions

The academic implications of excessive reliance on technology are complex and multiple. While digital tools offer numerous benefits, such as improved problem solving and personalized learning, they also present significant challenges, including cognitive impairment and decreased attention.

To address these challenges, teachers must take a well-balanced approach to incorporating technology, prioritize digital literacy, and promote active engagement in learning. By doing so, teachers can help students develop the critical thinking skills necessary to succeed in the digital age.

Overreliance on technology has had a

profound impact on traditional skills, such as writing, reading, and critical thinking. Although technology offers many benefits, overusing it can lead to a decline in these essential skills and also other negative consequences. To address these challenges, a balance must be struck between digital tools and traditional educational practices. This ensures that students develop a comprehensive set of skills to prepare them for success in the digital and non-digital worlds. Overreliance on technology poses a major challenge to balanced individual development and social cohesion. The negative impact on writing, reading, and critical thinking is well-documented,

and the psychosocial risks are becoming more apparent. The article emphasizes the need for a well-proportioned relationship between digital and analog, as well as the educational and societal responsibility in managing this phenomenon.

Integrating traditional skills into the academic process should not be considered a step backwards, but a complementary strategy that fosters critical thinking and intellectual depth. These types of interventions could be implemented throughout the curriculum, particularly in the humanities and social sciences, where logical structure, analysis, and reflection are essential.

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