

The Digital School between Paradox and Counter-Paradox

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Abstract: Contemporary schools adopt various digital infrastructures, such as electronic gradebooks and communication platforms, which support teachers in carrying out their daily activities. Students, for intuitive reasons, are instead required to refrain from using mobile phones and tablets during lessons, although many continue to use them covertly. It is undeniable that excessive or improper use of technology can be ineffective and sometimes even harmful; however, it is equally true that it is not possible to turn back time, nor is it easy to curb the tendency of learners to use mobile devices pervasively. In light of paradigms such as the Extended Mind and Distributed Cognition, several crucial questions therefore arise: to what extent does it make sense to ask students to give up tools that mediate their cognitive processes? When the use of devices cannot be effectively limited, what alternatives can be adopted? And how can these artefacts be used consciously to guide learning and foster the personal growth of learners? This contribution aims to address these questions through an extended learning perspective, capable of recognizing and enhancing the co-evolution of individuals, learning environments, and digital artefacts.

Keywords: Digital School; Distributed Cognition; Extended Learning; Resistance Management.

1. Introduction

The contemporary debate on the integration of digital technologies in educational contexts is characterised by a profound tension between drives for innovation and nostalgic impulses towards preservation. On a regulatory and institutional level, this ambivalence is reflected in the coexistence of forces pushing towards a pedagogical and didactic transformation and restrictive counter-forces, primarily fuelled by concerns about possible negative effects on students in terms of distraction, dependency, and loss of control (Stokel-Walker, 2025).

Digital policies thus reflect fragmented outcomes, in which cutting edge guidelines coexist with limiting requests (Goodyear et al., 2025). Such reactions historically accompany the introduction of new cognitive artefacts and emerge with vigour when they are grounded in conceptions of a dualistic mind, which sharply



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separate the subject from tools and contexts of use (Polenghi, 2024). As early as Steven Johnson (2012) showed, when examining resistance to mass media in a volume with the spellbinding title *Everything Bad Is Good for You: How Today's Popular Culture Is Actually Making Us Smarter*, how their use contributes, indeed, to stimulating higher-order cognitive processes and complex forms of thinking.

Overcoming the dichotomy between permission and prohibition therefore requires a shift in focus: from potentially intrinsic negative effects of the tool to the cultural and pedagogical frameworks that guide its adoption.

2. Paradox and Counter-Paradox

The integration of mobile devices in educational contexts today takes on a distinctly paradoxical configuration. On the one hand, schools are increasingly moving towards digitalisation at the organisational level; on the other, they often require students to renounce the very tools that mediate their ways of knowing. This misalignment risks amplifying certain inequalities, especially for learners with Special Educational Needs (SEN), and shifts onto individual institutions—and particularly onto teachers—the responsibility for managing systemic tensions that are far broader and more deeply rooted at the social level (Butler et al., 2024).

The structural paradox that emerges constitutes the expression of a deep fracture in the way the relationship between mind, tools, and learning environments is conceptualised (Mindzak & Kumar, 2024), especially when transmissive models of teaching are adopted that imply an isolated and self-directed mind definitions. If, in line with distributed cognition theories, artefacts are recognised as actively participating in the construction of knowledge, the issue can instead be addressed by considering the very conditions of knowing and the agency and inclusion opportunities they afford (Jeladze et al., 2017; Chen, 2025).

The paradox thus takes the form of an epistemological problem that highlights the gap between educational models and technically mediated cognitive environments (Amenta, 2013).

With regard to the management of resistance and oppositional dynamics, scholars from the Palo Alto school have shown that, in paradoxical situations, it is necessary to resort to equally sophisticated counter-paradoxical strategies (Bateson, 1956; Watzlawick et al., 1971). Although in education there is no intention to apply the counter-paradox in its technical sense (typically used in therapeutic settings), it is nonetheless useful to draw on the insights offered by strategic approaches. In particular, students' resistance and oppositional behaviours should not necessarily be discouraged. On the contrary, especially when they cannot be easily contained, they may be considered an important vehicle for change (Watzlawick et al., 1974, pp. 139ff.). Haley (1976, pp. 15ff.) supports this principle by suggesting that when resistance becomes less obstructive, it can be redefined and transformed into a collaborative attitude. From this perspective, the current normative rigidity risks reproducing the metaphor proposed by Watzlawick, Weakland, and Fisch (1974) of two sailors leaning backwards on opposite sides of a boat to keep it stable: the more one leans, the more the other must stretch in the opposite direction to compensate for the instability and prevent the vessel from capsizing.

Exiting the paradox means avoiding apparently illogical interventions and “moving forward rather than backward.” Instead of opposing the current of a river

and risking being overwhelmed by it, an alternative is to acknowledge it and redirect its force in a new and constructive direction (Erickson & Rossi, 1982).

This leads to the need for new frameworks capable of reinterpreting both the relationship between mind and tools as an inseparable ecological unity and resistant or oppositional behaviour itself (Covarrubias & Laiduc, 2024).

3. Extended Mind and Distributed Cognition

The debate on the use of digital devices in schools is often reduced to a polarised opposition between those who view technology as a resource and those who perceive it as a threat. To move beyond this dichotomy, it is useful to start from a theoretical assumption that cognitive sciences have clarified over recent decades: human cognition does not occur solely “in the mind” but extends into the tools we use.

A significant turning point is represented by the Extended Mind Theory (Clark & Chalmers, 1998) which, through the well-known thought experiment of Inga and Otto, shows how external tools can perform cognitive functions equivalent to those of biological memory. External artefacts—Otto’s notebook, and today the smartphone—can thus become an integral part of our cognitive processes.

A related perspective also emerges from studies on Distributed Cognition (Hutchins, 1995), which highlight how intelligence always operates within systems involving people, environments, and artefacts.

In the Italian context, these perspectives have been significantly re-elaborated within the pedagogical and didactic field. Calvani (2007), through the notion of an *Ecology of Learning*, emphasises how learning environments are now hybrid systems in which media, practices, and physical spaces construct genuine cognitive networks. These perspectives converge towards a Media Education approach (Rivoltella, 2017), which stresses the need for a school that educates students to a critical and conscious management of media, moving beyond the logic of simple prohibition. The key idea that emerges from this framework is that smartphones are not merely devices, but cognitive tools through which we think, remember, and orient ourselves in the world. Recognising this means radically changing the questions we ask: no longer “Do devices do harm or good?”, but rather “How can these artefacts be integrated into learning processes?”

4. Limits and Prohibitions: the Regulatory Framework and its Assumptions

In light of the theoretical framework outlined above, it becomes necessary to interrogate the regulatory choices governing the use of technologies in schools, since such policies are rarely neutral, but instead translate—into prescriptive form—a specific vision of cognition and of the educational role of the school institution.

The MIM Note no. 5274/2024 and the subsequent MIM Circular no. 3392/2025 prohibit the use of smartphones throughout the entire school day. The underlying logic of these measures appears clear: if devices distract, removing them solves the problem. At the level of implementation, however, the ban places teachers in a difficult position, as monitoring students to ensure they are not using their phones may generate conflict within the educational relationship. In this sense, critical literature on school technology regulation policies has shown that an excessive emphasis on control can produce significant side effects on the teacher’s role and on classroom relational dynamics (Selwyn & Facer, 2013).

A cultural dimension of the problem also emerges: the ban reflects a conception of the device as a threat to be neutralised rather than as a resource to be understood and pedagogically governed. This view, however, risks ignoring the role that digital media play in shaping the everyday and identity-related experiences of younger generations (Boccia Artieri, 2012), and deprives schools of the opportunity to fulfil their educational mission precisely where it would be most necessary. If it is true that young people live immersed in a digital environment, is it not the task of the school institution to teach them how to navigate it critically? (Rivoltella, 2013).

The risk, therefore, is that prohibition may produce forms of temporary containment, without affecting the construction of competencies or the transformation of students' cognitive and cultural practices (Buckingham, 2020).

5. Cognitive Artefacts and Intentional Didactic Mediation

If the theoretical framework highlights the overcoming of a conception of cognition as separate from artefacts, and the regulatory framework reveals its problematic implications, it becomes appropriate to question the role that digital devices can assume in learning processes.

Pellerey (2015), drawing on the constructionist perspective inaugurated by Papert (1980; 1993), recalls the idea that devices can be understood as cognitive artefacts capable of supporting specific forms of learning, provided that their use is situated within intentionally designed didactic frameworks. In the absence of conscious mediation, device use tends to translate into poorly regulated practices, exposed to the risk of distraction and information overload (Calvani et al., 2010).

Therefore, the issue is not whether to accept or ban their use, but rather to construct intentional forms of mediation based on guided use of devices, their integration into authentic tasks, and practices oriented towards the development of self-regulated learning (Zimmerman, 2002). The educational value of the device does not lie in the object itself, but in the pedagogical design that orients its use within teaching and learning processes.

6. Strategies and Operational Directions: from the Design of Practices to the Regulation of the Device

Overcoming the paradox of the digital school outlined in the previous sections cannot rely exclusively on regulatory solutions, but requires an evolution of educational action. This entails a shift from controlling devices and their use to the intentional design of learning practices that make use of digital technologies. Within this framework—and particularly in relation to pedagogical goals and the structuring of learning environments inspired by Universal Design for Learning (Børte & Lillejord, 2024)—the use of digital technologies acquires meaning.

Recognising devices as elements capable of intrinsically modifying the conditions of learning also transforms the teacher's role. No longer a supervisor, the teacher becomes a design-oriented mediator, able to convert technological constraints into formative levers, fostering students' processes of self-monitoring and metacognition (Fahrni et al., 2025).

From this perspective, device regulation evolves into an educational function aimed at the critical management of information flows and their processing. The goal is to mitigate information overload and the consequent increase in digital cognitive

load arising from the simultaneous use of multiple platforms, for example through targeted digital scaffolding (Ibrahim et al., 2025).

Effective strategies therefore move beyond the dichotomy between permission and prohibition, focusing instead on structured contexts that resolve the tension of the digital paradox through the use of authentic tasks, guided inquiry, and fact-checking. Such practices can help transform media from potential sources of distraction into epistemic tools, oriented towards the enhancement of problem solving as well as the development of creativity and critical thinking. Studies on mobile learning confirm that rapid and accurate source verification is a necessary prerequisite for devices to support critical thinking rather than amplify cognitive distortions (Gavronskaya et al., 2022).

Consequently, the teacher's mediation operates a transformative restructuring of the "classroom system", defining time, tools, and interactions to ensure understanding, active participation, and digital citizenship. This approach ensures accessibility for all students, including those with special educational needs, demonstrating that technology does not replace educational action but enhances its effectiveness and professional complexity, requiring sophisticated skills of didactic orchestration.

7. Pedagogical and Didactic Implications: from the Classroom to the Cognitive Ecosystem

The integration of digital technologies requires rethinking the classroom not as a transmissive space, but as a cognitive ecosystem in which subjects, interactions, and artefacts co-determine learning. Within this framework, cognition is distributed across practices and tools, reconfiguring the relationship between actors and media according to the logic of distributed cognition (Bai, 2025).

Attentional processes become situated and co-constructed dimensions: research indicates that in technologically mediated contexts, attention is intertwined with dynamics of co-regulation, while studies on joint attention highlight its distributed nature across subjects and digital artefacts (Kang et al., 2024).

The classroom thus becomes a space of pedagogical orchestration, in which devices are not external supports but active agents in the organisation of cognitive processes (memory, access to information, and information management). This level of integration configures the school as an extended cognitive system. In the absence of conscious pedagogical guidance, devices generate fragmentation and overload; when guided, they increase engagement and the quality of participation. It follows that the sustainability of this ecosystem depends on teachers capable of designing hybrid contexts and monitoring equity, preventing digital technologies from becoming a new factor of inequality.

8. Conclusions

The paradox of the digital school is not merely a crisis of tool management, but reflects a deep epistemological tension between an institution anchored in transmissive models of teaching and a cognitive reality that is intrinsically distributed. Overcoming this fracture requires a paradigm shift capable of transcending the sterile dichotomy between prohibition and permission.

First, a re-foundation of didactic mediation is needed: schools could move from the role of guardians of “pure” attention to that of designers of cognitive ecosystems, in which teachers act as design-oriented mediators capable of orchestrating the interaction between mind and artefact. Second, the urgency emerges to rethink and promote inclusive policies: if cognition is extended, depriving students—especially those with special educational needs—of technology means reducing part of their cognitive and learning system, risking the crystallisation of new forms of exclusion rather than promoting equity.

In conclusion, activating a virtuous counter-paradox implies that schools do not merely host digital technologies, but critically inhabit them. The challenge for the future does not lie in the power of the device, but in the quality of pedagogical orchestration. Only by transforming technological complexity into a lever for the development of critical thinking and self-regulation will it be possible to educate citizens capable of consciously navigating the complexity of contemporary society, making the learning environment a truly open, accessible, and coherent system in line with the evolving nature of the human mind.

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