Tao-Technology for Teen Mobile Use: Harmonizing Adaptation, Autonomy, and Reflection

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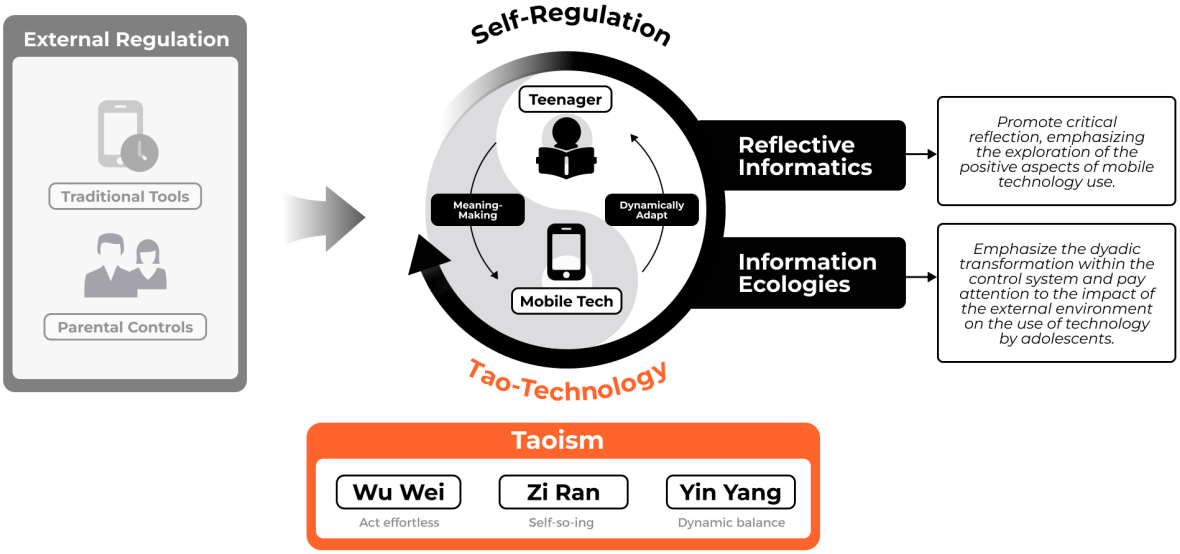

Figure 1: The conceptualized Tao-Technology framework presented in this position paper

Abstract

Adolescents' mobile technology use is often regulated through rigid control mechanisms that fail to account for their autonomy and natural usage patterns. Drawing on Taoist philosophy—particularly Wu Wei, Yin-Yang, and Zi Ran—this position paper proposes Tao-Technology, a self-organizing, adaptive regulatory framework. Integrating insights from Reflective Informatics and Information Ecologies, we explore how mobile technology can dynamically adjust to context while fostering self-reflection and meaning-making. This approach shifts from external restrictions to dynamic co-adaptative regulation, ensuring technology governance remains flexible yet structured, supporting adolescents in cultivating a balanced and intentional relationship with digital technology.

CCS Concepts

• **Human-centered computing → Human computer interaction (HCI)**.

Keywords

teens, digital health, taoism, self-regulation, reflection

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1 Limitations of Existing Approaches to Controlling Teenagers' Mobile Technology Use

Teenagers are often described as "mobile natives" [19], having been immersed in smartphone use from an early age and seamlessly

integrating mobile technology into their daily lives. However, excessive reliance on mobile devices has been shown to negatively impact their cognitive development and physical well-being [23–25]. Previous research has examined tensions between parental mediation and adolescents' autonomy in use of mobile technology [5, 9, 12], with a predominant focusing on regulatory strategies. These approaches include (1) negotiation-based parental mediation to balance parental involvement and teenagers' autonomy [7], (2) social translucence-based regulation to mediate information sharing and privacy in managing parental visibility of information on teens' mobile devices [28], and (3) traditional screen-time management strategies [13]. However, such strategies do not fully account for parents' varying levels of technology acceptance and may provoke psychological resistance among adolescents due to privacy and autonomy concerns [20]. Additionally, prior studies tend to overlook how adolescents develop alternative or evasive strategies to circumvent parent controls, thereby undermining their effectiveness [28].

Although research in the HCI field has increasingly focused on digital self-regulation, relatively little attention has been given to how teenagers themselves develop strategies for managing their mobile technology use [21]. Studies suggest that adolescents struggle with self-regulation more than adults [26], often failing to manage their device use in a deliberate and reflective manner [8, 27]. Given the gaps, and the complex socio-technical dynamics in which adolescent interact with mobile technologies at home and school [17], it is crucial to move beyond mere external regulation and foster adolescents' awareness and agency in self-regulated mobile device usage.

Moreover, the boundaries between technology and humans are increasingly fuzzy. As members of Gen-Z and Gen-A, who have grown up alongside mobile technology, adolescents experience its profound influence on their cognitive and behavioral development [4]. This necessitates a shift in how we conceptualize their engagement with mobile technology—not merely as a smart artificial tool for productivity and relaxation but as an extension of the self, a 'digitalized self' co-shaped by self-awareness and technology [6]. At the same time, this raises deeper ontological questions: To what extent does technology shape adolescents, and how do they, in turn, shape their interactions with it?

This evolving relationship between adolescents and mobile technology signals a need for HCI to move beyond the traditional human-centered paradigm [11]. As mobile technologies become increasingly entangled with adolescents' identities and ways of experiencing the world, HCI researchers and designers must critically examine not only how technology influences behavior but also how it co-constructs adolescents' sense of self and reality. This leads to a critical questions: *how can we support adolescents in constructing a reflective understanding of their mobile technology use to cultivate resilient self-regulation strategies?*

Most existing digital self-control tools rely on external, short-term constraints rather than fostering long-term, intrinsic self-regulation [16]. These approaches often lack sustained user motivation and a deeper understanding of the personal impact of mobile technology [20]. Davis et al. developed Locus, a self-regulatory tool designed to facilitate adolescents' reflection on unconscious social media use [10]. However, its ineffectiveness among some study participants reinforces Lyngs et al.'s argument that externally structured and mechanized reflective guidance through mobile technology is unsustainable [16]. Beyond external controls, fostering conscious meaning-making in mobile technology use is essential, empowering adolescents to engage with technology in a more intentional and self-aware manner.

In this position paper, we draw on Taoist philosophical perspective to reinterpret self-regulation strategies for adolescent mobile technology use. Specifically we apply the principles of Wu Wei (effortless action) and Yin Yang [15], which encourage fluid, adaptive self-regulation rather than rigid external control. We believe this approach fosters self-reflection and helps adolescents develop a natural rhythm of engagement with mobile technology. Furthermore, we integrate insights from reflective informatics [3] and information ecologies [18] to re-imagine alternative approaches to teenager technology use.

2 A Tao-Technology: New Rhythms and Patterns of Teenager Technology Use

2.1 From Intervention to Adaptation

In the Taoist classic Tao Te Ching, Lao Tzu introduces the concept of Wu Wei (effortless action), emphasizing alignment with natural rhythms, minimizing excessive intervention, understanding the deepest desires of the heart, and ridding oneself of external disturbances[15, p. 60] in order to achieve a state of harmony between the individual and society. In this state, an individual's behavior is fully consistent with the requirements of the current environment and situation to achieve a state of self-so-ing (Zi Ran) [15, p.80, p. 82].

Building on this, Allen's concept of *dao-engineering* provides a theoretical foundation for envisioning *Tao-Technology*–a model of technology use that facilitates to Wu Wei and Zi Ran [2]. His work explores how ancient Chinese technologies and artifacts were not rigid control systems but dynamic, evolving entities integrated into their environments [1]. He advocates for a design approach that achieves maximum effect with minimal intervention [15, p. 60], so that the development of technology should be dynamic and responsive, seamlessly integrated into the external environment deployed. Inspired by this, Tao-Technology seeks to move away from overly rigid interventions toward a more adaptive and responsive approach to adolescent mobile technology regulation.

Rather than treating mobile technology as a system that merely reacts to adolescent behavior, Tao-Technology acknowledges adolescents' individual agency and autonomy in regulating their own digital interactions. It operates as a self-organizing regulatory mechanism, dynamically adjusting its strategies in response to evolving usage patterns and cognitive development. Similar to Kim et al.'s approach, in which machine learning algorithms adapt digital device use interventions based on contextual factors to reinforce positive technology habits [14], *Tao-Technology* aims to be non-intrusive, promoting subtle guidance while reinforcing positive technology habits.

However, while this perspective promotes a less intrusive and more adaptive model of governance, it also raises critical questions about how to balance flexibility with necessary guidance –ensuring that adaptation does not lead to a lack of meaningful structure or

accountability. Reflective Informatics [3] provides an additional layer to this approach, suggesting that strategic reflection-driven interventions could replace traditional rigid control mechanisms. This perspective encourages adolescents not only to critically reassess their technology habits but also to explore personal meaning in their digital engagement.

2.2 Dynamic Adaption in A Yin-Yang Perspective

In Taoist philosophy, the concept of Yin-Yang [15, p. 103] transcends mere binary opposition and instead represents a relational and cyclical interdependence. Within the conceptual framework of *Tao-Technology*, this interplay manifests in the balance between control and autonomy, structure and flexibility, intervention and adaptation. Regulatory mechanisms should not impose rigid rules but instead continuously evolve in response to external factors—mirroring the dynamic balance of Yin-Yang.

Previous research on information ecologies [18] has identified various factors influencing teenagers' technology use, including local policies and access, affective factors, life stage and goals, and social relationships [17]. This research highlights the interplay and interdependence between individual agency, external conditions, and systemic influences in mobile technology regulation, aligning with the Taoist concept of Yin-Yang [15, p. 103]. Futhermore, it emphasizes that the regulatory mechanisms should continuously integrate inputs from external environmental shifts to account for their impact on adolescents' autonomy. For example, reflective guides could enable teenage users to document relevant emotions and evolving personal goals, ensuring that governance strategies dynamically adjust to maintain an appropriate balance between guidance and self-regulation.

We do not propose Tao-Technology as a fully developed framework but rather as an ongoing conceptual exploration of how Taoist principles might inform adolescent technology regulation. Our aim is to move beyond one-directional control (e.g., screen time restrictions) toward self-reflective regulation, where adolescents actively engage with their technology use rather than passively conforming to external constraints. To advance this discussion, we pose two key questions: (1) How can Taoist principles be systematically integrated into Tao-Technology to inform the design of adaptive mobile technology regulation models? (2) How can reflective interactions within these technological systems support unconscious reflection that leads to conscious self-meaning-making?

3 Conclusion and Workshop Goals

We adopt the Taoist concept of Wu Wei, Yin Yang and Zi Ran alongside existing HCI theories to explore an alternative paradigm for mobile technology design in adolescence. This exploration responds to a gap in current digital self-regulation research, which primarily focuses on self-tracking timers and restrictive interventions (lockout mechanisms) [20]. Rather than imposing external constraints, Tao-Technology proposes a co-adaptive relationship between adolescents and mobile technology—encouraging intentional and reflective technology use. By prioritizing reflection over control, this conceptual framework shifts away from mechanistic self-regulation and toward sustained meaning-making in digital habits, that could lead to sustainable behavior change [22]. Tao-Technology envisions a flexible yet structured model that harmonizes adaptation, autonomy, and reflection, offering a new perspective on adolescent digital well-being.

Our aims for attending this year's workshop are: (1) to provoke a broader discussion on the integration of Taoist Philosophy into teenagers' mobile technology self-control strategies; (2) to explore how reflective design can foster conscious self-meaning-making in adolescent technology use.

4 Authors' Background in this Research Area

Pengyu Zhu is a master's student in the Division of Industrial Design at the National University of Singapore. His research explores the ethical dimensions of emerging technology through design research methods, aiming to shape more inclusive technology that empowers people—especially marginalized groups—to reflect on the positive significance of technology use and engage in self-meaning-making.

Janghee Cho is an Assistant Professor in the Division of Industrial Design at National University of Singapore. His research explores well-being, health, the future of work, and reflective design to understand how technology can promote sustainable living and address uncertainty in everyday life. Through a sociotechnical lens, he examines how technology can foster inclusivity, flourishing, and meaningful reflective practices.

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