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Understanding and Designing Technology to Support Mentoring Functions in Chinese Design Teams

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ABSTRACT

Mentorship effectiveness is highly context-dependent, necessitating empirical investigation to inform the design of intelligent support systems. The design industry's subjectivity and rapid tool iteration intensify reliance on experienced mentors, a demand amplified by the high-pace environment and feature-rich products of Chinese design teams. We conducted in-depth interviews with 23 Chinese designers to investigate this underexplored context. Our findings reveal a fundamental bifurcation of Kram's functions: career functions are instrumentalized for project efficiency, while psychosocial support suffers a systemic deficit driven by a lack of psychological safety. This impairment is rooted in structural challenges like individual traits and educational gaps. Participants proposed an intelligent mentoring system, leveraging technologies both to reduce mentor workload and to mitigate relational risks. Our research contributes an unique account of functional impairment under high-pace contexts and provides actionable design implications for supporting mentoring in the Chinese design industry.

KEYWORDS
Mentoring functions; design team; interview

CCS CONCEPTS
Human-centered computing → empirical studies in collaborative and social computing; empirical studies in HCI

1. Introduction

Mentoring is widely recognized as a cornerstone of professional development, facilitating essential knowledge transfer, skill acquisition, and socialization for organizational newcomers (Clutterbuck, 2005; Mullen & Klimaitis, 2021). The established theoretical framework for understanding mentoring relationships is often rooted in Kram's model, which delineates two primary functions: career support (including sponsorship, exposure and visibility, coaching, protection, and challenging assignments) and psychosocial support (including role modeling, acceptance and confirmation, counseling, and friendship) (Kram, 1985). However, the practical implementation of mentoring functions is sensitive to the specific industry context. For example, in medical contexts, mentorship should identify and address gaps in practice, spare mentees from risk and workload, and ensure safety (Lambert et al., 2024). Furthermore, as professional environments grow increasingly complex and time-constrained, a growing body of work suggests that technology and intelligent systems may be essential for enhancing mentoring interactions (Hui et al., 2018; Tan et al., 2025; Tomprou et al., 2019). For example, AI can serve as an intelligent mentor to foster creative thinking by providing case-based guidance and examples (Zha et al., 2025). Therefore, the design of intelligent mentoring systems necessitates a deep understanding of mentoring practices within their specific contexts.

Design problems are typically characterized as "ill-structured" problems without definitive criteria to evaluate proposed solutions or specific processes to apply these criteria (Jung et al., 2017). This inherent subjectivity in outcome assessment and the high variability of the design pathway make career development challenging for junior designers. Consequently, skill mastery is difficult to achieve through

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theoretical learning alone; it relies instead on situational knowledge and expert judgment transmitted by experienced mentors. The professional context further dictates this reliance. The industry's demanding characteristic of rapid iteration necessitates flexible methods like agile development (Williams, 2010), replacing idealized design processes (Hunt, 2025). Furthermore, the accelerated evolution of design tools (e.g., the shift from Sketch to Figma (Feng et al., 2023; UXness, 2025), and the emerging integration of Generative AI into design workflows (Shaer et al., 2024; Siemon, 2023)) reduces the shelf life of purely technical expertise. As a result, career growth depends less on tool proficiency and more on the mentor's ability to impart meta-skills like design thinking, problem decomposition, and adaptive learning strategies. In addition, as the designer serves as the critical bridge connecting user needs and technical implementation (Zhang, 2024; Zytko et al., 2022), proficiency in communication skills becomes paramount and is often best acquired through mentorship. These factors collectively establish mentorship as an indispensable mechanism for the advancement of design professionals.

The necessity of mentorship is further amplified within the Chinese design environment. Major digital platforms such as WeChat[1] have evolved from standalone applications into highly integrated infrastructures that combine communication, payment, and service ecosystems (Wydymus, 2023). This process of platformization and infrastructuralization has resulted in feature-dense and rapidly evolving systems, which substantially increase the cognitive and coordination demands placed on designers (Chen, 2025; Jia et al., 2022). Moreover, organizational structures in Chinese technology companies are often characterized by centralized decision-making and hierarchical communication norms (Baker, 2025), which can constrain upward feedback and informal design-project knowledge exchange. Under such conditions, mentees tend to rely heavily on mentors as gatekeepers of organizational knowledge, risk assessment, and strategic prioritization. At the same time, intense market competition and organizational practices oriented toward accelerated innovation have compressed development cycles and prioritized speed over refinement. Through industrialized innovation processes, simultaneous engineering, and rapid incorporation of user feedback, Chinese firms are able to bring products to market at exceptional speed (Williamson & Yin, 2014). These conditions shift mentoring interactions toward problem-driven and just-in-time guidance rather than long-term developmental support. In addition, the dominance of super-app ecosystems and feature-rich digital platforms increases technical interdependencies and contextual complexity, making expert guidance critical for navigating cross-functional constraints and design risks (Zhong, 2021).

In contrast, design teams in many Western contexts often operate within relatively more modular and decentralized product environments and longer development cycles (Baker, 2025; Topolsky, 2018; Zhong, 2021), allowing greater room for decision-making discussion, reflective practice, and long-term career development guidance. Therefore, the mentor's guidance becomes even more critical in the Chinese design context. Despite the strong dependence of design career development on expert support and these distinctive organizational pressures, empirical research on mentoring relationships in design teams remains sparse. Existing studies predominantly focus on the collaborative tool utilization and the dynamics of cross-functional teamwork (Bruun et al., 2025; Feng et al., 2023; Mangano & van der Hoek, 2012; Maudet et al., 2017; Oehlberg et al., 2012; Ostergaard & Summers, 2009; UXness, 2025), neglecting the underlying mechanics of mentorship itself.

This article aims to address this research gap by providing an in-depth, empirical understanding of the current practices and challenges of mentoring relationships within Chinese design teams. Considering that UX is viewed as a cornerstone in the human-centered design of interactive systems and has experienced rapid growth in both practitioner numbers and organizational adoption (Gray et al., 2015; World Leaders in Research-Based User Experience, 2017), we focus the scope of our study on "UX design," hereafter "design." Our research aims to answer three research questions (RQs):

- **RQ1**: What is the current state of practice of mentoring function implementation in Chinese design teams?
- **RQ2**: What factors impede the implementation of the mentoring function within Chinese design teams?

- **RQ3**: How do participants envision future roles for technology in supporting design mentoring processes?

Our contributions are threefold:

- A description of instrumentalized career functions and psychosocial deficit. Specifically, career functions were prioritized for project delivery rather than mentee growth, while psychosocial functions suffered a severe deficit due to a pervasive lack of psychological safety.
- An empirical analysis of the challenges that impeded mentoring function implementation. We provided a comprehensive account of the interplay of multi-level challenges, including mismatched personalities and competitive mindsets, organizational velocity, industry high expectation, and educational deficits.
- Design implication for a technology-augmented mentoring system. We proposed a suite of features for intelligent systems to not only reduce the mentor burden and increase efficiency, but also function as a zero-risk confidant to mitigate relational risks and restore psychological safety within Chinese design teams.

2. Related work

2.1. The mentoring relationship

Mentoring is typically defined as a long-term, reciprocal interaction established between a more experienced or senior individual (mentor) and a less experienced individual (mentee), fundamentally focused on career advancement and psychosocial support (Clutterbuck, 2005; Mullen & Klimaitis, 2021). The concept of mentoring is rooted in historical practices such as the Greek mythical origins of apprenticeship (Siddiqui, 2014). Early forms were predominantly informal, centered primarily on the transmission of technical skills within specific trades, often characterized by a singular structure and inherent power imbalance (Gessler, 2019; Steedman, 2015). By the latter half of the 20th century, the increasing complexity of organizational structures and labor markets drove a significant shift toward the modernization and formalization of mentoring relationships. This functional expansion moved beyond mere skill transfer to encompass organizational socialization, political guidance, and psychological support (Edgar & Schein, 2010; Ragins & Kram, 2007). For instance, Levinson et al.'s adult development theory highlights the mentor's critical role in providing emotional support and visionary guidance during the mentee's life transitions (Reilly, 1979).

In 1985, Kathy Kram proposed the seminal framework of mentoring functions to systematically analyze the quality and fulfillment of specific needs within modern mentoring relationships. Kram's model divides the functions into two core categories. The first category is career functions, which are designed to enhance the mentee's progression within the organization. These include sponsorship, coaching, exposure and visibility, protection, and challenging assignments. The second category focuses on psychosocial functions, aiming to foster the mentee's sense of self-efficacy, professional identity, and interpersonal competence. These comprise role modeling, acceptance-and-confirmation, counseling, and friendship (Kram, 1985; Ragins & Cotton, 1999). Subsequent literature reinforces the multi-functional nature of the mentor role. For instance, in 2012, Crow reviewed the literature and assigned multiple support roles to mentors, including guide, advisor, teacher, coach, role model, sponsor, support, counseler, and even friend (Crow, 2012; Mullen & Klimaitis, 2021). While Crow's synthesis affirms the breadth of support provided by mentors, these roles are generally defined broadly. For example, roles like "support" lack the specificity necessary for empirical analysis, blurring the lines between career and psychosocial support. Thus, our study adopts Kram's functional framework as the primary theoretical lens. Due to its comprehensive, empirically validated nature, and its clear delineation between career and psychosocial functions, Kram's model provides the detailed mechanism required to evaluate the precise implementation of mentoring functions within the UX design field.

2.2. Research on mentoring relationship in UX design domain

In competitive industries, design managers are challenged to mitigate issues of employee disengagement, attrition, and burnout, with organizational literature suggesting mentorship as a potential tool for talent retention and development. Despite this importance, the topic has garnered minimal empirical attention from design researchers. Existing research is limited, primarily consisting of single-perspective explorations (e.g., from the mentor's view) that only reveal challenges like time pressures and organizational conflicts (Huber et al., 2022). This scarcity of research on the mentee perspective, the implementation of specific mentoring functions, and the need for technological support represents a critical research gap. Consequently, this section reviews the well-established novice-expert paradigm to understand the asymmetric expertise exchange that inherently shapes the mentor-mentee relationship.

The novice-expert paradigm is a conceptual framework used to investigate the cognitive and behavioral differences between individuals at varying levels of skill and experience within a particular domain (Lieberei et al., 2023). This paradigm has gained traction in the design domain, with previous studies highlighting the cognitive and behavioral differences between novice and expert designers (Casakin & Levy, 2023; Casakin & Singh, 2019; Reimlinger et al., 2019; Teng et al., 2022; Zhou et al., 2022). Research has identified differences between novice and expert designers in diverse aspects, such as cognitive processes and design activities (Casakin & Levy, 2023; Casakin & Singh, 2019). Expert designers consistently demonstrate superior problem scoping and a cascade pattern in their design activities, prioritizing thorough information gathering and early iteration between steps before committing to development (Atman, 2019; Atman et al., 2007). This reflects a more interconnected mental representation of design problems, allowing them to proactively identify broader information needs and constraints (Björklund, 2013; Haupt, 2015). In contrast, novice designers often exhibit a lack of self-confidence and may neglect critical steps, such as market context analysis and problem clarification, until later stages, frequently engaging prematurely in the generation and sketching of solutions (Atman, 2019; Jagtap, 2018). These behavioral differences underscore a core need in the novice designer, including the transfer of domain-specific knowledge, goal-limited strategies, and effective problem-solving approaches, precisely the functions addressed by a mentoring relationship.

UX design is inherently collaborative, with practitioners engaging in both cross-functional collaboration with non-UX stakeholders and intra-team collaboration. Intra-team collaboration refers to the situation where two or more UX practitioners work together on the same design project, reviewing and discussing design outputs to reach a consensus on the final design solutions (Kuang et al., 2022). Using the diverse perspectives of UX professionals, teams can increase efficiency and productivity by sharing workload, reach rigorous solutions by mitigating personal biases, and develop skills by exchanging knowledge (Feng et al., 2023; Lollypop, 2025). Although sharing similar work processes, methods, and tools, UX practitioners face communication burdens due to the inherent characteristics of design. Design ideas are inherently subjective and ambiguous, often leading to divergent interpretations. To address this challenge, various artifacts such as prototypes and computer-aided collaborative tools are employed to facilitate a more precise understanding and effective communication (Chiu, 2002; Lee, 2024; Wohlrab et al., 2018).

The cognitive and knowledge gaps identified by the novice-expert paradigm directly shape the nature of this collaboration, often resulting in an asymmetric exchange of expertise. This dynamic frequently manifests as mentorship-driven interactions, where expert designers naturally assume the role of the mentor, and novices function as mentees, establishing an unidirectional knowledge flow through consultation, pair design, and review (Canfora et al., 2005; Deken et al., 2012). This difference in confidence and domain knowledge also often leads to imbalanced power dynamics, where expert influence may significantly affect novice learning and decision-making (Singh et al., 2021).

The established novice-expert dynamic serves as a vital theoretical underpinning for understanding mentoring relationships in UX design, as it clearly articulates the fundamental exchange of asymmetric expertise between the mentor and mentee. While prior research has identified how cognitive differences influence collaboration, mentoring is not solely determined by these intrinsic cognitive factors. In industry, the relationship is reshaped by organizational constraints, such as tight deadlines and quality delivery standards (Choi & Larusdottir, 2024). These pressures transform the interaction from a purely pedagogical mentor-mentee dynamic into colleagues who must achieve project goals (Feng et al., 2023; Kuang et al., 2022).

Critically, both the novice-expert paradigm and traditional apprenticeship models share a set of foundational assumptions that are rarely made explicit: that knowledge transfer unfolds within conditions of developmental intent, that mentees are afforded graduated exposure to increasing complexity, and that mentees are provided emotional support and visionary guidance (Gessler, 2019; Reilly, 1979). These assumptions, however, may not hold in high-pace industrial contexts characterized by compressed development cycles, centralized accountability, and output-oriented evaluation. When organizational conditions reduce the time and relational safety required for gradual knowledge transfer, the implementation of mentoring functions may diverge from what either the traditional apprenticeship or the novice-expert paradigm would predict. The existing literature lacks empirical investigation into how these cognitive differences manifest in current collaborative practices and what additional challenges arise from organizational pressures. Therefore, our study utilizes the novice-expert lens to examine the outward manifestation of this dynamic (as viewed through Kram's functions) and comprehensively identify the challenges that shape the actual practice of mentoring in real-world UX teams.

2.3. Technologies used in UX design collaboration

The inherent collaborative nature of UX design has catalyzed the development of tools to facilitate teamwork in various collaboration scenarios, including co-located versus distributed environments and synchronous versus asynchronous interactions (Mangano & van der Hoek, 2012; Matthiesen & Bjørn, 2017; Oehlberg et al., 2012; Wang et al., 2022). These tools aim to overcome communication barriers, streamline workflows, and support artifact sharing, thus improving collaboration (Jung et al., 2017; Striner et al., 2022). A survey of collaborative practices in UX design reveals that practitioners predominantly leverage everyday tools like Figma and Miro, which incorporate features for real-time editing and feedback, effectively streamlining standard workflows and artifact sharing (Feng et al., 2023; UXness, 2025). However, these tools are primarily designed for general collaboration and consensus-building, often failing to specifically support the distinct needs of asymmetric novice-expert interactions, which is foundational to a mentoring relationship.

Recent technological advancements in artificial intelligence (AI) offer new channels to address these collaborative challenges. While AI is being explored as a moderator or visualization tool in general design collaboration (Han et al., 2024; Shin et al., 2022; van den Broek et al., 2024; Wang et al., 2024), both research and applications on its impact on UX teams remain nascent, lacking standardized workflows for collaborative AI utilization (Gi Shin et al., 2023; Takaffoli et al., 2024).

Crucially, research examining AI-assisted creative tasks reveals distinct patterns in user needs and tool utilization between novices and experts. Novices frequently use AI capabilities as learning scaffolds to overcome obstacles like understanding domain-specific terminology or task decomposition. Conversely, experts tend to leverage AI primarily for efficiency and idea validation (Angert et al., 2023; Hou et al., 2024). This divergence is evident in assistive tools developed specifically for novices, such as systems that provide common solutions or offer targeted feedback to improve skills (Kariyawasam et al., 2024; Kwon et al., 2024; Ngoon et al., 2021). This reveals a limitation that existing technological research predominantly addresses the needs of the individual designer or one party (the mentee as a learner), rather than focusing on the actual mentoring interaction. The tools are optimized for individual task completion, not for the core mentoring functions, such as knowledge transfer, feedback delivery, and psychological support. Furthermore, this divergence in usage patterns might impede effective collaboration when novices and experts work together using the same AI-enhanced toolset, adding friction to the mentoring relationship itself (Cockburn et al., 2015).

Therefore, it is essential to investigate the unmet needs and challenges that emerge during mentoring processes. Understanding these constraints will inform the development of more adaptive technological supports specifically designed to enhance mentoring interaction, bridging the expertise gap while supporting the complementary strengths of both novice and expert designers in real-world scenarios.

3. Method

To reach more UX practitioners residing in geographically diverse locations, we conducted online semi-structured interviews. The interviews focused on three main aspects: (1) current practices in implementing the mentoring functions, (2) challenges faced in current mentoring relationships, and (3) envisioned technological support for mentoring. To prevent mentors and mentees from influencing each other, we conducted the interviews individually. The study protocol was reviewed and approved by the Institutional Review Board of the Hong Kong University of Science and Technology (Guangzhou), with the approval number HSP-2025-0003.

3.1. Participants

We initially recruited participants by advertising on social media platforms. The selection criteria were UX practitioners who are either currently mentoring others or being mentored themselves. Some participants referred friends or colleagues to the study, and we applied the same selection criteria to these referrals. Finally, we recruited 23 UX practitioners (gender: 12 female, 11 male) for our study and Table 1 shows the participants' information.

The mentee group ranged in age from 22 to over 30 years, with one participant declining to disclose their exact age. The mentor group ranged from 25 to over 30 years, with one participant similarly choosing not to report their age. The average professional experience of mentees was approximately 1.5 year ($SD = 0.69$), compared with 6 years for mentors ($SD = 2.13$).

The mentee group comprised UX designers ($N = 6$), UX/UI designers responsible for both UX and UI design ($N = 3$), an UX researcher ($N = 1$), a product designer ($N = 1$), and an UI designer ($N = 1$). Their products included enterprise products (i.e., internal tools, SaaS products, and to business products; $N = 3$), smart hardware (i.e., water purifiers, cleaning robots, and medical products; $N = 3$), AI-powered products ($N = 3$), consumer products (i.e., mobile games and web products; $N = 2$), and FinTech products (i.e., mobile banking; $N = 1$).

The mentor group included senior UX designers ($N = 5$), senior UX/UI designers ($N = 3$), a senior UI designer ($n = \mathrm{N}$), a lead game designer ($N = 1$), and a design team manager ($N = 1$). They primarily worked on enterprise products (i.e., to business products; $N = 6$), AI-powered products ($N = 2$), consumer products (i.e., mobile games and online community products; $N = 2$), and FinTech products (i.e., digital wallets; $N = 1$).

Table 1. Demographic information of the participants ($N = 23$).

ID	Age	Gender	Job title	Work exp.	Industry	Employees
N1	24	Male	UX/UI designer	2 Years	AI-powered products	<10
N2	26	Female	UX researcher	1.5 Years	Water Purifier	2k+
N3	23	Female	UX/UI designer	1 Year	Cleaner robot	200+
N4	22	Male	UX designer	1 Year	Mobile games	10k+
N5	30+	Female	UX designer	0.5 Years	Internal tools	150k+
N6	23	Female	UX designer	2 Years	AI-powered products	30k+
N7	23	Male	UX designer	1 Year	Mobile banking	10k+
N8	32	Male	UX designer	2 Years	Saas products	80k+
N9	33	Female	Product designer	1.5 Years	To business products	<10
N10	24	Male	UX/UI designer	1 Year	Medical products	20k+
N11	25	Male	UX designer	3 Years	Web products	200k+
N12	22	Female	UI designer	2 Years	AI-powered products	30+
E1	30	Female	Senior UX/UI designer	6 Years	AI-powered products	200k+
E2	32	Female	Senior UX/UI designer	10 Years	To business products	<50
E3	30+	Female	Senior UX/UI designer	5 Years	To business products	20k+
E4	25	Female	Senior UX designer	4 Years	To business products	> 50
E5	30	Male	Lead game designer	8 Years	Mobile games	1k+
E6	25	Male	Senior UI designer	3 Years	Digital wallet	200k+
E7	32	Male	Design team manager	9 Years	Online community products	30k+
E8	28	Female	Senior UX designer	5 Years	To business products	200k+
E9	30	Male	Senior UX designer	6 Years	AI-powered products	5k+
E10	27	Female	Senior UX designer	5 Years	To business products	5k+
E11	31	Male	Senior UX designer	5.5 Years	To business products	1k+

3.2. Procedure

We selected online meeting software according to participants' preferences, such as Tencent Meeting or Zoom. Two authors participated in each interview. One acted as the primary moderator, and the other was responsible for note-taking and supplementary questioning. Each interview lasted approximately one hour, and participants were compensated with the local currency equivalent of USD 7. Each interview was structured into four phases.

3.2.1. Introduction of the interview

The moderator introduced the three main topics of the interview and instructed the participants to sign the consent form and fill out the pre-survey to collect demographic information.

3.2.2. Retrospection of participants' mentoring workflow

Participants were asked to recount the workflow of their current mentoring or mentee relationship, including the initial contact, allocation and execution of design tasks, evaluation of design outcomes, and any interactions that occurred outside of work. After describing a relatively comprehensive workflow, participants were invited to freely share their memorable experiences with previous mentors or mentees.

3.2.3. Discussion of the retrospection results

During the sharing process, one author documented the key points of current practices and challenges from participants, which then served as the basis for discussion. When a specific mentoring function was mentioned (e.g., personalized instruction, which falls under the "coaching" function), we probed further to identify any associated challenges and their underlying causes. To ensure comprehensive coverage of mentoring functions, we also followed up on unmentioned functions to determine whether they were absent or simply overlooked.

3.2.4. Envision of the technological support

In this part, participants were first invited to share their ideas on how technology could support the implementation of mentoring functions. Throughout the preceding retrospection phase, the note-taker continuously documented the challenges mentioned by participants. After participants had finished sharing, we asked about any challenges they had not mentioned, in order to clarify whether these were forgotten or perceived as unsolvable through technological means. A detailed interview guide is provided in Appendix.

3.3. Data analysis

We adopted Kathy Kram's nine-function mentoring framework as the coding scheme. The data were divided into three sections: (1) current practices, (2) current challenges and their underlying causes, and (3) envisioned technological support. Within each section, the nine functions served as the primary coding categories. After initial coding, we applied an inductive approach to each section to identify common themes (Braun & Clarke, 2021).

In the data from the first section, we identified four themes for the coaching function and two for the protection function, while each of the remaining seven functions generated a single theme. In the second section's data, we identified four thematic categories of underlying causes. In the third section's data, we found that technology could potentially support eight of the nine mentoring functions (all except sponsorship). We further organized these proposed technology features according to the mentoring workflow shared by participants and identified seven overarching directions through which technology could support the mentoring process.

The coding process was conducted in multiple stages to ensure reliability and analytical rigor. First, all 23 interview transcripts were distributed among the first three authors for data cleaning and extraction of mentoring-related statements. The first author subsequently reviewed and supplemented the extracted data to establish a consolidated coding database.

To calibrate the coding scheme, the three authors independently coded five randomly selected transcripts (N1, N5, N10, E3, E10). Discrepancies were discussed in weekly meetings, during which coders justified their interpretations of how each mentoring function should be operationalized in this dataset until consensus was reached. Most disagreements involved boundary cases where excerpts could reasonably relate to multiple mentoring functions.

After achieving alignment on coding criteria, the remaining 18 transcripts were distributed among the three authors for independent coding. The first author then conducted a consistency review across coded transcripts to identify discrepancies, which were flagged and resolved through further discussion in weekly meetings.

For theme development, the first author conducted an initial thematic synthesis by reviewing coded excerpts in relation to the research questions. The second and third authors subsequently reviewed and refined the emerging themes. Through iterative discussions, the three authors reached consensus on the final thematic structure. The subsequent section presents a detailed examination of the identified themes, illustrated with representative participant quotations, translated from Chinese to English.

4. Findings

4.1. Current practices of mentoring function implementation

We first analyzed the current implementation of each mentoring function and then synthesized four themes, including tasks, resources, relationships, and growth, as shown in Table 2. This section introduces each theme along with the functions it encompasses.

4.1.1. Tasks: Efficiency, delivery, and risk avoidance

The Tasks dimension focuses on practices related to work allocation, project execution, and risk management. This dimension encompasses the functions of Protection, Challenging Assignments, and Sponsorship. Findings revealed that in a high-efficiency environment, the imperative for timely project delivery and the need for risk avoidance primarily drove the implementation of these functions, often restricting the mentee's access to high-stakes assignments and meaningful sponsorship opportunities.

4.1.1.1. Protection. Among designer mentors and mentees, the protection function resembles project risk management, focusing primarily on safeguarding project outcomes and team efficiency. Mentors perceived their primary responsibility as ensuring the timely and high-quality delivery of projects. As E1 emphasized, "Mentoring always comes after delivery." To maintain project progress, mentees could even be removed from projects. For instance, E8 stated, "If a deliverable is due to the development team on Friday and by Wednesday the mentee still has not completed their task, I will reassign it to someone else." Other mentors reported that they would revise mentees' design drafts themselves or produce a new version to meet delivery requirements. This is because, if deadlines are missed, accountability falls on the mentor rather than the mentee. Mentees clearly understood that "if something goes wrong, the mentor takes the blame," (N2) and therefore accepted the transfer of decision-making authority. As N6 noted, "I am not qualified to make design decisions. Even if I were given decision-making power, I would not want to bear the associated risks. I always confirm with my mentor whether a design solution is acceptable."

4.1.1.2. Challenging assignments. Both mentors and mentees reported that mentees had limited exposure to challenging assignments. Mentors, under delivery pressures, tended to assign low-cost tasks or provide highly specified design directions. As E4 noted, "I do not dare to give mentees deliverable-critical tasks." Similarly, E2 stated that to avoid inappropriate designs from mentees, he would directly provide reference images for them to follow a prescribed style. "In actual work, I do not have time to wait for mentees to explore multiple design styles before deciding on one. Only university instructors would do that." Mentees listed examples of low-cost tasks, such as preparing 100 PowerPoint slides for an early childhood education project or digitalizing stickers in a conference. They expressed dissatisfaction with such allocations, as N5 remarked, "Apart from wasting time and energy, I gained nothing."

Table 2. An overview of the mentoring function implementation practices.

Mentoring function	Task	Resource	Relationship	Growth
Sponsorship	√			√
Coaching		√		
Protection	√			
Challenging assignment	√			
Exposure and visibility		√		
Role modeling				√
Acceptance and confirmation			√	
Counseling			√	√
Friendship			√	

The first column lists the nine mentoring functions derived from Kram's model, while the remaining columns show the four core elements of the mentoring relationship, which are identified from participants' perspectives. The alignment between these elements and functions is marked with '✓'.

4.1.1.3. Sponsorship. Sponsorship involved the mentor using their seniority to promote mentees for challenging and visible tasks that led to advancement. It was mentioned relatively infrequently by both mentors and mentees during the interviews. Mentees' career opportunities and trajectories emerged through two pathways. The first involved self-determined choices, as illustrated by N9, "My mentor offered me options, asking whether I wanted to focus solely on interaction design for specific features or to take responsibility for both feature consolidation and interaction design." The second pathway reflected ability-based allocation, as described by E7, "We regularly review and adjust work responsibilities, including quarterly and year-end reviews." Some mentors exhibited impaired sponsorship due to problematic mindsets. For example, N5 stated, "My mentor seemed to treat me as a tool for dirty tasks in order to prevent me from taking over his work."

4.1.2. Resources: Knowledge acquisition, exposure, and tools

The resources dimension examined how mentees gained access to essential knowledge, skills, visibility, and tools required for their design work. It included the functions of Coaching and Exposure and Visibility. Coaching practices have evolved to incorporate both ability assessment and adaption to the AI era, where tools served as crucial resources. Notably, the motivation for providing exposure was often driven by the need to optimize team efficiency, rather than purely developmental.

4.1.2.1. Coaching. Coaching involves the mentor teaching the mentee specific professional skills, offering guidance, and providing feedback to improve job performance. It was the mentoring function most frequently mentioned by both mentors and mentees. We identified the following four themes primarily.

4.1.2.2. Ability assessment and personalized guidance. In assigning work tasks, mentors employed strategies such as "initially assigning a small task to observe performance" (E2) or "using the company's standard grading criteria—for example, the skills expected at the junior-one level" (E3), to assess mentees' capabilities and allocate appropriate tasks. At the same time, mentors also tailored their guidance according to mentees' educational backgrounds, for instance, "assigning mentees trained in interaction design to produce innovative interaction proposals, while allocating UI design tasks to those with a background in visual design." (E4).

4.1.2.3. Transformation of mentoring models in the AI era. Proficiency in AI tools has become a core competency for design professionals. As N7 noted, "The design industry now emphasizes the concept of the AI 'blue team,' referring to dedicated groups that use AI specifically for functional design." Consequently, training mentees to use AI tools to support design work has emerged as a new task within mentor coaching. Given that mentees are often more open to, and curious about, new tools, a form of reverse coaching has also developed in which mentees instruct mentors on AI tools. For example, N3 stated, "When my mentor asked me to search for illustrations on Huaban,[2] I taught him how to generate them using Midjourney."[3]

4.1.2.4. A "guidance-with-restraint" philosophy. To foster mentees' independent thinking, mentors reported that they would not directly prescribe how tasks should be carried out but instead offer prompts to guide mentees' own reasoning. For instance, E9 mentioned a website homepage redesign project, "I asked the mentee what kind of brand values the redesign was intended to convey, thereby prompting them to think through the design solution." Mentees, however, noted that even with such prompts, they sometimes lacked clarity on how to execute the design and thus preferred more explicit instructions, which they found more conducive to learning. For example, N4 stated, "My mentor told me which color to use for a button. After hearing this repeatedly, I understood how to apply the color system."

4.1.2.5. The subjectivity of design standards. Unlike many other disciplines, design lacks clear evaluative criteria, a challenge acknowledged by both mentors and mentees. For example, E6 remarked, "After working on an interface for a long time, I can no longer tell whether it is good or bad." Similarly, N1 noted, "Sometimes I feel my design output is poor, but my mentor thinks it is usable, which confuses me." When disagreements arise between mentors and mentees regarding design solutions, mentees typically modify their work according to the mentor's feedback. This absence of explicit evaluative standards may shift mentees' focus from pursuing good design to producing the design their mentor expects. N2 illustrated this point, "When my mentor asked me to design questions for an usability feedback scale, he had already envisioned the chart style that would appear in the usability report. My task was essentially to put on paper the questions he had in mind."

4.1.2.6. Exposure and visibility. Within the design team, the implementation of the exposure-and-visibility function followed a clear pattern of gradual exposure and exhibited pragmatic characteristics. Mentors typically allowed mentees to begin interfacing with product managers and developers independently after three to four months, progressing from passive observation of meetings to full, autonomous communication. Notably, the primary driver of this exposure was not the deliberate cultivation of mentees' external visibility, but rather considerations of work efficiency. As E6 explained, "Allowing mentees to participate directly in communication meetings enables them to gain a more comprehensive understanding of the project, which benefits design," reflecting an instrumental rather than developmental orientation. Moreover, mentees reported using AI tools as communication bridges. For example, N5 stated, "I once collaborated with a modeler skilled in dark aesthetics, while our team preferred a more soothing style. I found verbal descriptions insufficiently precise, so I generated images with Midjourney in advance to convey the desired style."

4.1.3. Relationship: Psychological support, trust, and boundaries

The relationship dimension centers on the interpersonal and emotional aspects of the mentor-mentee dynamic, including psychological safety, trust, and non-work interactions. This section analyzed Acceptance and Confirmation, Friendship, and Counseling. The data highlighted a fear-driven dynamic, where mentees hesitated to seek help, undermining psychological safety. Furthermore, Counseling and Friendship were constrained by workplace hierarchies and efficiency culture, leading to an imbalance in the supply and demand for emotional and career support.

4.1.3.1. Acceptance and confirmation. Within the execution of the acceptance and confirmation function, the mentoring relationship displays a paradoxical dynamic: although this function is intended to provide support and confirmation, mentor–mentee interactions are often grounded more in fear than in trust. Mentees commonly worried that revealing their shortcomings could lead to dismissal, prompting them to keep problems to themselves. They usually avoided seeking help (E1, N3, N5, N8), refrained from innovative attempts (E4), and waited anxiously for feedback after completing tasks (N1). This fear drove them to turn to alternative sources of help, such as AI. For example, N1 took screenshots of the user interface design and asked ChatGPT to identify which design elements need adjustment. Mentors varied in how much they recognized and accommodated this fear, depending largely on their personalities and work styles. Supportive mentors proactively create a psychologically safe environment. For example, E4 described her solutions, "I told mentees not to worry about feasibility and to let go of mental burdens, and I set up shared documents that allowed them to express ideas freely."

Contrastly, under high work pressure, some mentors unconsciously applied the standards of their peer colleagues to mentees. When mentees' comprehension or execution fell short of expectations, they exhibited impatience or even apparent frustration.

4.1.3.2. Counseling. There was a clear mismatch between supply and demand in the counseling function. Both mentors and mentees regarded career-development counseling as important. For example, E5 noted, "many mentees did not understand career pathways, such as which levels they should reach within three years, and which skills to develop to support their advancement. Yet no mentee asked me about this." Similarly, E8 reported that given the current fast-paced work environment, he did not initiate such discussions with mentees unless they approached him first. These accounts highlighted the strong reliance of counseling on mentees' initiative. However, many mentees hesitated to initiate the dialogue, partly out of concern that "saying more would lead to more mistakes." (N6) Moreover, mentors expected mentees to "bring valuable questions" (E4, E5) and interpreted overly broad or vague inquiries as a lack of independent thinking. This created a paradox: mentees needed career knowledge to pose valuable questions, yet it was precisely their lack of such knowledge that made counseling necessary. In addition, the internet industry's high-efficiency culture further constrained opportunities for in-depth dialogue, resulting in an almost complete absence of emotional support. As N11 noted, "in the internet industry, no one cared about people's emotions."

4.1.3.3. Friendship. Within design teams, the development of the friendship function in mentor–mentee relationships was limited, primarily constrained by workplace hierarchies and individual personalities. From mentors' perspectives, expectations were focused on mentees' team integration. For instance, E4 reported discomfort when his mentee referred to the team as "your team," interpreting such language as indicating a lack of team identification. Conversely, mentees preferred to maintain a degree of distance, noting that they would only reciprocate kindness once it had been initiated, otherwise fearing additional psychological pressure (N6). Interestingly, friendships emerged beyond formal work boundaries. The use of AI tools provided a typical illustration; owing to ambiguous company policies, N5 and his mentor privately exchanged experiences with tools such as Midjourney. This joint exploration created a more equal communication space. These dynamics suggested that the friendship function tended to arise incidentally rather than by design.

4.1.4. Growth: Skill development, role modeling, and career trajectory

The Growth dimension focuses on the mentee's long-term career advancement. This dimension was primarily driven by Role Modeling and intersected with the developmental aspects of Counseling and Sponsorship. Mentees adopted a rational and critical attitude toward the mentor as a role model. Moreover, the overall growth trajectory was often constrained by the aforementioned passive nature of counseling and the limitations placed on sponsorship by project risk.

4.1.4.1. Role modeling. In the execution of the role-modeling function, mentors primarily demonstrated their professional competence through daily work, aiming for mentees to acquire full-process capabilities, including project planning, design thinking, production of deliverables, and cross-departmental collaboration. This demonstration extended beyond technical skills to a shift in mindset. As E5 explained, "Senior designers are problem-oriented, whereas junior designers often wield a hammer (tools) in search of a nail (problems)." In addition to professional expertise, mentees reported learning soft skills from mentors, such as emotional management. For instance, N12 observed the mentors' emotional regulation in interpersonal interactions, "No matter how unsatisfactory my output was, my mentor would first offer encouragement before suggesting improvements, which greatly motivated me." However, this role-modeling relationship was not one of uncritical admiration. Mentees expressed a more rational and critical stance toward their mentors' exemplar status. While acknowledging the value of mentors' experience, N1 emphasized that design itself is an innovation process that requires abandoning past experience. Few mentees even questioned the link between tenure and capability. As

N8 remarked, "He may have worked for five years, but perhaps three of those were spent browsing entertainment apps."

4.2. Challenges in mentoring function implementation

We identified four key factors influencing the implementation of the mentoring function in design teams (see Table 3).

4.2.1. Individual traits and mindsets: Barriers to communication and trust

Participants frequently reported that individual differences undermined communication styles and trust, weakening the foundations of the mentoring relationship. Such differences included mentors' mindset issues, skill limitations, and poor work habits, as well as mentees' personality traits, work attitudes, and communication patterns.

These mentee characteristics produced negative coaching outcomes and diminished mentors' motivation. Mentors identified three main problems. First, mentees often lacked accurate self-assessment of their abilities. As E7 noted, "Mentees are insufficiently aware of their shortcomings. Even when I point out weaknesses, such as shallow design thinking, they do not know how to improve and sometimes overestimate their competence, leading to delays." Second, mentees communicated poorly due to fear. E4 remarked, "My mentee dislikes updating me on progress because he is afraid to show his work." E1 added, "When I gave feedback, the mentee claimed to understand, but the revised version showed otherwise." Third, mentees lacked initiative and task ownership. For example, E5 said, "At first, I was eager to share my design thinking, but the mentee absorbed only about 30% and did not act on it, so now I am more restrained." Similarly, E3 reported, "I asked a mentee to research a composite filter design. He merely sent me a collage of screenshots without considering why I assigned it or how it related to our product context." These drawbacks disrupted coaching and reduced mentors' engagement.

While mentee characteristics undermined coaching outcomes, mentors' own limitations also shaped the effectiveness of the relationship. Mentors faced a zero-sum mentality and capability constraints. Some mentees perceived their mentors as competitive. As N5 explained, "Rather than seeing my growth as reflecting well on them, they treated my taking on work as taking a slice of their cake." This competitive stance impeded sponsorship, as mentors feared mentees' advancement could threaten their own positions. E8 stressed the need for sufficient competence to protect mentees. "As a mentor, I must have a fallback plan to cover for a mentee's underperformance." Yet N5 observed that some mentors lacked this ability. "They become emotional because they cannot backstop the mentee's work." Similarly, insufficient skills weakened mentors' credibility as role models, as N8 noted, "I felt my mentor's design skills were weaker than mine. He attained his position only through seniority."

Rather than operating as isolated individual traits, these mentee and mentor behaviors interacted to produce communication gaps, obstructing acceptance and confirmation, counseling, and friendship functions. For instance, mentees' shame ("It feels embarrassing to keep asking questions"-N8) and mentors' emotional remarks ("Aren't you an art major? How can your UI be so poor?"-N12) eroded trust and impaired acceptance and confirmation. Other communication gaps also undermined relational

Table 3. An overview of the factors influencing the implementation of the mentoring functions.

Mentoring function	Individual traits and mindsets	Organizational and cultural contexts	Industry and societal trends	Educational backgrounds and competence differences
Sponsorship	√	√		
Coaching	√	√	√	√
Protection	√			
Challenging assignment		√		
Exposure and visibility		√		
Role modeling	√			
Acceptance and confirmation	√		√	
Counseling	√	√		
Friendship	√			

The first column lists the nine mentoring functions derived from Kram's model, while the remaining columns show the factors—identified from participants' perspectives—that hinder their implementation, marked with "√".

development, such as mentees failing to provide emotional reciprocity ("I explained a lot online but got no response"—E4) and mentors' delayed replies ("I sent my mentor questions but waited a long time for answers, which made me anxious"—N12). These gaps impeded the growth of counseling and friendship.

4.2.2. Organizational and cultural contexts: Challenges of high pace and internal friction

Both mentors and mentees highlighted the company's efficiency-driven culture, which left mentors little time for coaching and deprived mentees of trial-and-error learning. E1 explained that the team often used AI to generate visual materials such as banner designs. If a mentee's output was unsatisfactory, the mentor would demonstrate or adjust parameters directly because "the delivery pace is too fast to let mentees learn gradually." Several mentors also reported lacking coaching skills, implying insufficient organizational training. For instance, E4 struggled to assign suitable tasks to a mentee from an art background but needed to develop the interaction design skill, while E5 found it difficult to mentor three mentees and quickly assess their abilities.

Participants also described a centralized accountability system placing full responsibility for mentees' outcomes on mentors. This policy encouraged risk avoidance and tighter control, leading mentors to withhold challenging tasks and limit mentees' exposure to other departments. E9 recalled sending a mentee to a cross-departmental meeting where the mentee lacked confidence to express design views. Product priorities dominated the discussion, producing poor design decisions that the mentor later had to renegotiate. This experience discouraged the mentor from allowing mentees to attend such meetings independently.

The organization lacked transparent promotion mechanisms and clear career paths, undermining the sponsorship and counseling functions. As E5 noted, "Many mentees did not know their promotion paths or which skills to develop." The efficiency-driven environment further constrained mentors' willingness and time to provide career counseling, leaving mentees without professional guidance on planning or skill development.

The evaluation system also concentrated authority for performance reviews, contract renewals, and promotions in mentors' hands, lacking objective standards. This arrangement turned mentors from advocates into gatekeepers. E8 stated that if a mentee submitted flawed work, they would attribute it to a lack of ability rather than investigate its cause, reflecting a shift from support to judgment. This power imbalance also weakened counseling. Fearful of negative evaluations, mentees complied with instructions rather than seeking advice. As N2 noted, "I just do whatever my mentor tells me, because my mentor decides whether my design outcome passes." Consequently, mentees focused on executing directives instead of pursuing deeper guidance on career development, skills enhancement, or industry knowledge.

4.2.3. Industry and societal trends: Conflicts between AI and value systems

Participants generally perceived that AI development and broader social changes had influenced the coaching and acceptance and confirmation functions. Most reported that their companies supported AI tools to improve efficiency, with many developing internal tools. Yet participants also noted that AI reduced mentees' learning opportunities while providing shortcuts for task completion. As E2 recalled, junior designers had once learned by manually creating interface elements and full layouts, but AI now performed these tasks. Several mentors also observed mentees using AI to avoid effort. For instance, E4 noted that one mentee submitted an AI-generated interaction flow without critical thinking. At the same time, some mentees found AI helpful for understanding complex concepts, such as clarifying technical terminology or business contexts. Although mentors increasingly incorporated AI training into coaching, the loss of learning opportunities and the temptation of shortcuts remained unresolved challenges in the AI era.

Mentors also described a broader shift from long-term accumulation to rapid implementation, which heightened expectations for newcomers and constrained acceptance and confirmation. E2 reflected that early-career mistakes had once been tolerated, whereas newcomers were now expected to perform immediately, discouraging them from asking questions. E6 likewise observed an industry climate too impatient for conceptual or future-oriented design. This shift reflected a reduced acceptance and tolerance of newcomers in the design industry, underscoring challenges to the acceptance and confirmation functions.

4.2.4. Educational background and competence differences: Gaps in thinking and cognition

Educational background and competence differences emerged as a barrier undermining the coaching function. Mentors commonly reported that mentees exhibited deficiencies in critical thinking and problem-solving capabilities, which impeded effective knowledge transfer. For example, E4 noted a mentee "submitted AI-generated content without any personal reflection," while E9 described excessive dependence on feedback where mentees would "seek approval for every minor modification." These behaviors created unsustainable demands on mentors' time and reduced coaching efficiency.

E5 attributed these deficiencies to systemic issues in design education. His analysis of Chinese design programs revealed two critical weaknesses. First, the theory-practice disconnect resulted from a teacher who "lacked industry experience," leading to instruction that emphasized theoretical concepts without practical frameworks. Second, tool-centric curriculum design prioritized software proficiency over conceptual development, exemplified by courses that "followed market trends – adding 3D Max when popular, then Photoshop when trendy." He argued that effective design education should cultivate integrative thinking capabilities, enabling students to synthesize creative concepts with interdisciplinary knowledge. He illustrated this through skeuomorphic design, explaining how students should understand "lotus leaf-inspired forms are functional decisions based on hydrophobic properties," not merely aesthetic choices. However, such analytical depth was absent. "These critical thinking skills are rarely developed in classroom settings. My most valuable learning occurred through library research, representing institutional failure."

As illustrated in Figure 1, these challenges do not operate in isolation. Educational gaps shape individual competence, particularly limiting the development of critical thinking, resulting in a pattern in which mentees possess procedural knowledge of tools and theories but lack the capacity to apply them to resolve complex design problems. This pattern is further intensified by industry- and organizational-level efficiency pressures, as well as centralized accountability structures that concentrate evaluative authority in mentors' hand. Together with mentors' and mentees' personal traits and mindsets, these interacting conditions reinforce efficiency-oriented and fear-driven communication patterns, and constrain the development of psychosocial functions.

4.3. Envisioned technological support for mentoring functions

As shown in Table 4, the participants primarily proposed six technological features to support the development of mentoring functions through complementary mechanisms. The findings showed that the features most frequently cited were those leveraging AI. Participants viewed AI as helpful in two aspects: enhancing operational efficiency by executing routine design and mentoring tasks, and providing personalized guidance through data-driven recommendations. Participants also emphasized the necessity of establishing databases, which were viewed as foundational resources for learning scaffolding and organizational memory. These repositories encompass elements such as design knowledge, mentoring best practices, and project documentation. Some participants proposed recommendation features, specifically focusing on supporting adaptive developmental planning by suggesting personalized learning resources, communication styles and career developmental pathways. Reminder functionality primarily facilitated relational coordination by sustaining interaction rhythms and aligning expectations between mentors and mentees. Checklist features supported self-regulated learning by enabling mentees to systematically assess their work before formal review. Recording functionalities further enabled reflective practice by preserving discussion and feedback trajectories.

In summary, results demonstrated that both mentors and mentees prioritized technological support for career functions, particularly coaching, as these functions directly aligned with the performance-driven and time-constrained nature of design work. Under conditions of high workload and compressed development cycles, technology was primarily expected to facilitate task execution and skill acquisition. Concurrently, participants indicated that technology could enhance psychosocial functions

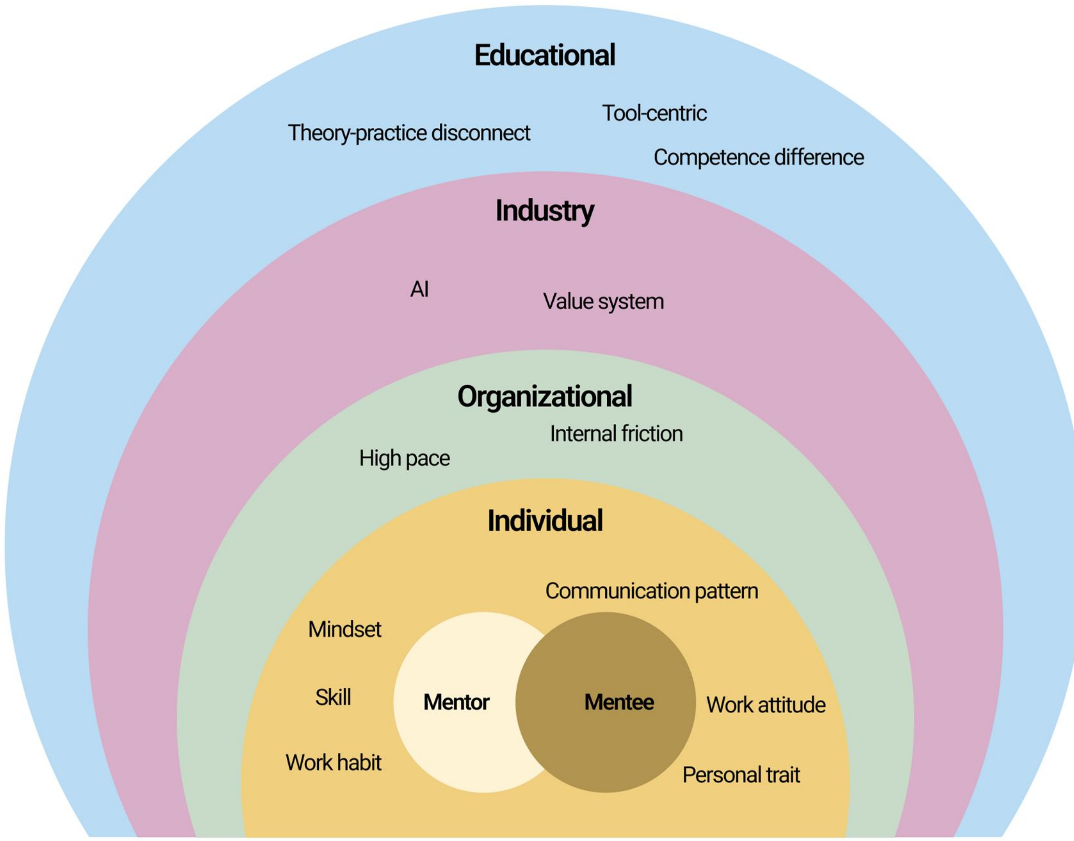

Figure 1. A multi-level model of challenges shaping mentoring practices in Chinese design teams. The figure illustrates how individual, organizational, industry, and educational factors jointly interact to constrain the implementation of mentoring functions. Individual-level traits and communication patterns are embedded within organizational conditions such as high pace and internal friction, which are further shaped by industry-level AI adoption and efficiency norms, as well as educational gaps in theory-practice integration. Together, these interacting layers contribute to efficiency-oriented and fear-driven dynamics and functional impairments in mentoring relationships.

Table 4. An overview of the expected technological features to support mentoring functions.

Mentoring function	Reminder	Checklist	AI	Recording	Database	Recommender
Sponsorship						
Coaching	√	√	√	√	√	√
Protection			√			√
Challenging assignment			√			
Exposure and visibility			√		√	
Role modeling			√		√	
Acceptance and confirmation	√		√			
Counseling			√		√	√
Friendship			√			√

The first column lists the nine mentoring functions derived from the Kram's model, while the remaining columns show the features—identified from participants' perspectives—that can support the mentoring relationships, marked with '√'.

by acting as a mediator. Specifically, a psychologically safer mentoring environment could be fostered by moderating dialogue and augmenting mentee performance. This finding underscores the potential for technology to address interpersonal risk. Conversely, support for the sponsorship function was entirely absent, reflecting the realization that this function relies primarily on the mentor's organizational power and social capital, which are inherently difficult for technology to facilitate.

Taken together, these findings indicate that participants did not envision isolated technological features, but rather an interconnected support system that spans capability development, task execution, relational mediation, and long-term growth. These proposed features jointly address different phases and dimensions of mentoring under conditions of high complexity and time pressure. To synthesize these insights and guide future system design, we organize them into an integrated design framework and corresponding design agenda, as detailed below.

4.3.1. Design for compatible and adaptive mentoring pairing

E4 has noted that the effectiveness of the mentoring system partially depends on the compatibility between the mentor's and mentee's personalities. He suggested leveraging technologies to ensure this alignment, "There should be a system, which can utilize matching algorithms based on psychometric assessments such as MBTI, to pair individuals effectively. If the match proved unsuccessful, the mentoring relationship should be adjusted in time." E3 also expressed interest in a mentorship knowledge database, "AI could use this resource to guide me on how to mentor interns." This technological support was designed to achieve two goals: establishing a good foundation for effective counseling and friendship between the mentor and mentee, and guiding the mentee's personalized development paths through tailored coaching strategies. This highlights the importance of enabling low-cost reconfiguration of mentoring relationships to sustain long-term effectiveness.

4.3.2. Design for rapid contextual immersion and learning scaffolding

Participants noted that integrating mentees into complex design environments presents numerous challenges, and thus proposed two interconnected features: AI-assisted onboarding and knowledge management systems. AI-assisted onboarding was envisioned to streamline their familiarity with the design project. E1 proposed a comprehensive AI assistant which could "prepare onboarding materials for mentees, including their working standards, team roles, design tasks, previous design outputs, and so on." Beyond the initial setup, other participants (E3, E4, E7, E8, E9) also suggested using specific AI mentorship functions (e.g., summarizing frequently asked questions, assisting with design and AI software learning) to assist with the continuous learning during onboarding.

Knowledge management systems were envisioned to tackle the knowledge transfer inefficiencies. These repositories include general design knowledge (e.g., color theory), expert experience sharing, and product-related documentation. As E8 noted, "Although it will not help junior designers immediately master this knowledge - seeing the repository does not instantly translate to application in actual design tasks - it informs novices about the foundational content they need to acquire, allowing them to prioritize learning based on their needs." These findings underscore the importance of providing structured yet flexible scaffolding to support early-stage learning.

4.3.3. Design for embedded and just-in-time work support

During the design process, participants focused on technological features that augmented work content to reduce workload and save time for challenging assignments. These features include assistance with scheduling, file management, design research, information retrieval and analysis, alternative idea generation, and the generation of design outputs such as user journey maps and interaction flows. These features were designed to enhance the efficiency of the mentee's workflow. To address the immediate informational needs that arise during execution, N4 proposed an AI mentor designed to learn from organizational expert knowledge to answer questions throughout the design process. Furthermore, N5 suggested that AI could alert mentors when mentees might need help, "For instance, if the mentee suspends interactions with the program for an extended duration, the AI could prompt the mentor to ascertain whether assistance is required." This proactive feature was viewed as crucial for providing timely support. Building on this concept, E5 noted that establishing a product knowledge base could serve as a foundation for developing a QA chatbot capable of providing real-time knowledge support to mentees. The functionality of the AI support system was dependent on a specialized knowledge base. E9 suggested establishing a comprehensive product knowledge base that consolidates all relevant materials and documentation, such as design histories and related records. This specialized repository, alongside the general design knowledge database, was viewed as essential for structuring the expertise required by the AI mentor. Together, these features highlight the need to situate mentoring support directly within work practices to enable timely intervention.

4.3.4. Design for guided self-regulation and quality alignment

To enhance the quality of mentee deliverables and reduce the review burden on mentors, both groups suggested quality control features. A fundamental proposal was the implementation of a checklist system. E3 proposed a summarized criteria list to help novices self-evaluate their design outputs prior to human review. Building upon this, several participants envisioned integrating organizational standards into the system via AI-supported verification. E8 suggested providing criteria from companies to AI systems to automatically verify whether mentees' design outcomes meet established standards. Further emphasizing the demand for automated quality control, multiple participants (E9, N7, N3, N11) recommended AI-supported checks to ensure the consistency of the design system and adherence to data-supported user interaction patterns. This collective focus on automation aimed to empower mentees to maintain high standards and ensure the quality of design projects. These features were intended to promote reflective self-monitoring and reduce necessary review cycles, thereby balancing quality assurance with mentor workload.

4.3.5. Design for lightweight progress synchronization

To address problems of progress management, participants proposed features centered on timely synchronization. A direct approach to ensure timely interaction was the reminder system. E4 envisioned such a system developed for mentees, "For example, if two days have passed without any progress update, the system would remind the mentee to synchronize with the mentor." Complementing this, the AI summary feature aimed to streamline the content of progress updates for busy mentors. E3 designed an AI plugin for design tools that "can accompany juniors throughout the design process, summarizing design challenges, junior solutions, and design validations, then reporting these core elements to me." This summary feature served not only as a record but also as a mechanism for the mentor to quickly ingest the mentee's progress, enabling timely intervention without requiring constant oversight. This suggests the importance of sustaining interaction rhythms through low-cost coordination mechanisms.

4.3.6. Design for low-risk and psychologically safe feedback exchanges

The process of exchanging and managing feedback emerged as a critical point of friction, leading to extensive proposals focused on improving both feedback efficacy and relational safety between mentors and mentees. To address problems of lost and fragmented information, N2 proposed an automatic recording feature to prevent missed feedback. Going further, N10 and N11 suggested that AI could extract, analyze, and summarize design feedback scattered across shared documents, meetings, and work chats, then recommend design modifications to optimize the feedback management process. Furthermore, to enhance communication clarity, N6 expressed a need to prompt clarification for unclear expressions, "I was uncomfortable making such reminders or asking for clarification, so I hoped AI could do this for me."

Participants designed emotional features to mitigate psychological barriers and create a safer communication environment. E4 proposed features like recommending stickers, collecting personality profiles and communication preferences, and providing real-time emotional adjustment notifications. This sentiment was echoed by N6, "I hope mentors will not mix in too much emotional output during collaboration and can calmly point out issues. I also hope to receive some encouragement. I wish AI could remind mentors of this." A more aggressive intervention was proposed by N12, who wanted AI to directly rewrite emotionally charged communications from mentors to create more balanced interactions. Additionally, N1 suggested AI supervision of mentor-mentee communications with reporting capabilities to protect mentees, stemming from a concern that design discussions could lead mentors to feel their authority challenged, thus negatively affecting professional relationships. These emotion-focused communication features could alleviate novices' psychological barriers. These findings highlight the importance of mitigating interpersonal risks and fostering psychological safety through mediated communication support.

4.3.7. Design for continuous and personalized developmental pathways

Addressing the long-time goal of mentee growth, participants viewed technology as a means to provide support that alleviated mentor time constraints and ensured continuous learning. Participants proposed features that leveraged AI to structure and track the mentee's growth. E1 envisioned an AI assistant that would provide a professional development framework, outlining learning objectives across different timelines (e.g., the initial three-day readings, accomplishments for weeks four to six, and objectives for the third month). This assistant would periodically track their progress, effectively substituting for some of the monitoring duties traditionally performed by the mentor. To guide the mentee's ongoing skill acquisition, N10 suggested AI could analyze mentor-mentee conversations to identify knowledge gaps and then recommend specific learning tutorials to mentees. By dynamically adapting guidance to individual pathways, such systems can support personalized skill development and career planning.

4.3.8. An integrated framework for technology-supported design mentoring

Synthesizing the above design principles, we propose an integrated framework that organizes technological support for mentoring in Chinese design teams along three interrelated dimensions (Figure 2): capability scaffolding, work-oriented support, and relational coordination.

The first dimension, capability scaffolding, focuses on establishing foundational conditions for mentee growth through compatible pairing, structured onboarding, and personalized developmental pathways. This dimension supports mentees' early sensemaking, skill and knowledge acquisition, and alignment with mentors' expectations.

The second dimension, work-oriented support, centers on embedding just-in-time support and quality regulation within everyday design workflows. By integrating task-level support and guided self-evaluation mechanisms, this dimension enables mentees to manage complex work demands while reducing mentors' supervisory burden.

The third dimension, relational coordination addresses the interpersonal and temporal dynamics of mentoring relationships. Through lightweight progress synchronization, mediated feedback exchanges, and emotion-aware communication support, this dimension fosters psychological safety, mutual awareness, and sustained developmental engagement.

Together, these three dimensions constitute an integrated configuration through which technology-supported mentoring is enacted in high-complexity and time-pressured design environments. Rather than functioning as isolated tools, the proposed features operate as interdependent components that jointly shape learning processes, work practices, and relational dynamics. To concretize this framework and demonstrate how this framework and corresponding principles may be instantiated in practice, we developed a scenario-based storyboard illustrating a potential system implementation (Figure 3), grounded in participants' accounts. The storyboard illustrates the instantiation of capability scaffolding

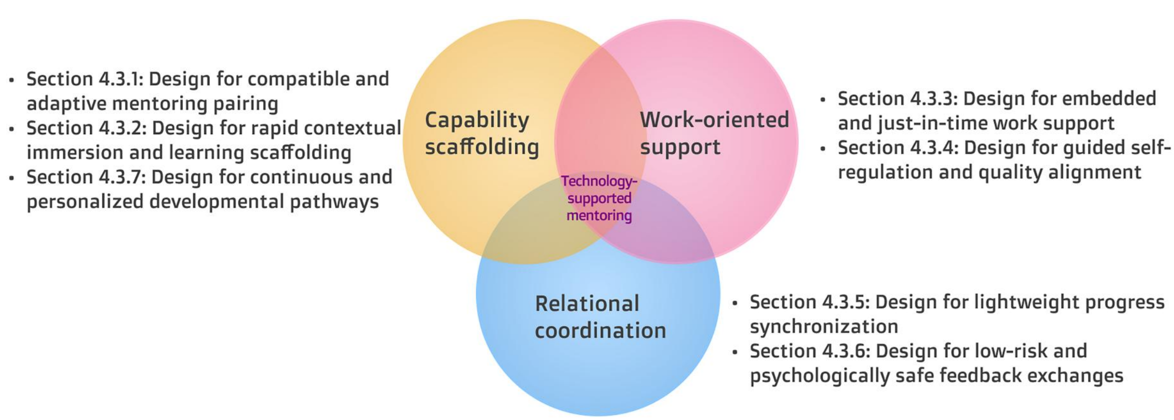

Figure 2. An integrated framework for technology-supported mentoring in Chinese design teams. Based on participants' accounts and the derived design principles, the framework organizes proposed technological supports into three interdependent dimensions: capability scaffolding, work-oriented support, and relational coordination. Technology-supported mentoring is conceptualized not as an independent component, but as an integrated configuration constituted through the interaction of these three dimensions.

Figure 3. An illustrative storyboard grounded in participants' accounts, demonstrating how the proposed framework may be instantiated in practice. (a) Mentee–mentor matching: the system recommends mentor–mentee pairings based on profile and skill data, and suggests relevant mentoring strategies from the mentorship knowledge base to assist mentors in making mentoring plans. (b) AI-assisted onboarding: Aggregated working standards, team roles, design tasks, and previous design outputs are organized into personalized onboarding materials. (c) Knowledge management system: a shared repository integrates curated design principles, expert tips, and project archives to support situated learning. (d) Proactive help alerts: Activity logs and interaction patterns are monitored to identify prolonged stagnation and prompt mentor intervention. (e) Design review and quality assurance: Automated self-check mechanisms compare design outputs against organizational checklists prior to human review. (f) Reminder system and progress synchronization: Timeline data and task records are used to generate lightweight reminders and condensed progress summaries. (g) Automatic Recording and feedback extraction: Meeting transcripts and collaborative documents are processed to extract key feedback, unresolved issues, and action items. (h) Emotional communication support: Linguistic cues are analyzed to provide tone-awareness prompts and constructive phrasing suggestions. (i) Continuous learning and development: Interaction traces and performance records inform adaptive learning plans and long-term development tracking.

by enabling mentee-mentor matching (Figure 3(a)), AI-assisted onboarding (Figure 3(b)), knowledge management system (Figure 3(c)), and continuous learning and development (Figure 3(i)) features. The work-oriented support is instantiated through proactive help alerts (Figure 3(d)), design review and quality assurance (Figure 3(e)), and automatic recording and feedback extraction (Figure 3(g)) features.

In addition, the relational coordination dimension is instantiated through reminder system and progress synchronization (Figure 3(f)) and emotional communication support features (Figure 3(h)).

5. Discussion

Through our investigation of current practices and challenges of implementing mentoring functions in the UX design team, we identified that current implementation focused more on career functions, neglecting the psychosocial functions needed by mentees. The underlying causes extended across individual, organizational, societal, and educational dimensions. Furthermore, we identified that mentors expected technology to reduce their workload by taking on certain career functions, such as knowledge transfer and progress management. In contrast, the mentees not only hoped that technology could assist them in design execution, but also expected it to provide psychosocial functions during the design communication process, thereby fostering a psychologically safe work environment. In the following section, we discuss current practices and challenges and propose design implications for future technology-assisted mentoring systems.

5.1. The bifurcation of mentoring functions: Instrumentalized career support and deficit in psychosocial care

The implementation in Chinese UX teams reveals a structural deviation from Kram's two-factor model, characterized by an instrumentalization of career support and a deficit in psychosocial care. This bifurcation was primarily driven by the high-efficiency, risk-avoidance nature of the internet industry. From a theoretical perspective, this pattern does not indicate the emergence of an entirely new set of mentoring functions, but rather a contextual reconfiguration of Kram's model. While the core categories of career and psychosocial support remain analytically relevant, their enactment is reshaped under conditions of high system complexity and accelerated development cycles. Our findings extend Kram's model by demonstrating that in high-speed design environments, mentoring functions become selectively instrumentalized and rebalanced under conditions of efficiency pressure, performance-based evaluation, and centralized accountability.

The realization of career functions was predominantly oriented toward organizational efficiency and risk management rather than mentee development. Prior research highlighted a similar pattern: mentoring often priortized task completion over individual growth. For example, Lambert et al. found that surgical mentoring focused on safeguarding the mentee from risky procedures, a function driven by patient safety (Lambert et al., 2024). However, our findings revealed a functional inversion driven by project efficiency. The mentor's role in Protection has been adapted to prioritize project delivery. This mentor-centric risk aversion limited the mentee's access to valuable Sponsorship and Challenging Assignments, which were high-risk for a deliverable-critical environment. The result was that career functions were utilized as tools for team output, restricting their original purpose as levers for individual growth. This pattern represents a contextual extension of expert–novice and apprenticeship models, which typically emphasize learning through guided participation and progressive responsibility. Our findings show that under efficiency pressure and centralized accountability, mentors' expertise is redirected from learning scaffolding toward project risk mitigation and delivery assurance. As a result, mentees' access to challenging assignments and exploratory learning opportunities becomes constrained. This suggests that knowledge asymmetry does not have uniform developmental effects, but can produce inverse outcomes depending on organizational conditions.

The neglect of psychosocial support was a pervasive issue across various professional environments (e.g., hackathons (Nolte et al., 2020), academic settings (Im & Toyama, 2024)), but the speed and pressure of the UX industry transformed this deficit into a systemic communication failure. In traditional apprenceship, psychosocial functions are expected to provide emotional support and relational security that enable open communication and learning. However, our findings suggest that these functions were weakened in high-pace design contexts. Studies on academic mentoring noted that behaviors like lack of time, inconsistent guidance, and communication discomfort were not merely scheduling issues, but could manifest as subtle forms of academic bullying (Im et al., 2024). The practices identified in our study, including mentor lack of time and the mentee's sense of uncomfortable expression, echoed these subtle forms of relational impairment.

More specifically, performance-efficiency and centralized accountability structures jointly reinforced these impairments. Under compressed development cycles, design deviations and delays carried high organizational costs, incentivizing mentors to prioritize risk control and close supervision over open-ended guidance. Meanwhile, concentrated evaluative authority transformed everyday interactions into implicit performance assessments, rendering trial-and-error exploration and help-seeking psychologically risky (Collaros & Anderson, 1969).

The cumulative effect of these organizational and relational constraints might create the fear-driven dynamic and the resulting proactiveness paradox observed among the mentees. Rather than actively seeking feedback and engaging in discussions, mentees tended to comply with instructions and avoid exposing uncertainties. The lack of psychologically safe human support has driven mentees to seek alternative, non-judgmental resources. Our finding revealed that the mentees turned to AI for feedback was an indicator of this psychosocial gap. AI-mediated confirmation highlighted that fear has guided the mentees to find a "zero-risk confident" to fulfill their need for psychological safety.

5.2. Structural roots of functional impairment: The interplay of individual, organizational, and contextual barriers

This section discussed the structural and contextual factors identified in the findings that contributed to the functional impairment and psychosocial deficit observed in the Chinese UX mentoring practices.

Our participants noted that individual differences like personalities could impede the implementation of mentoring functions. Previous research indicated that mentor preference for capable and proactive mentees correlated with positive mentoring outcomes (Allen, 2004). Our findings aligned with this, showing that mentee's lack of initiative or inaccurate self-assessment reduced mentor teaching efficacy and even led to the withdrawal of support. More critically, these individual issues became structural problems due to a lack of scientific matching and mentoring value perception within the organization. The mentor's zero-sum mentality undermined the sponsorship function. This competitive stance reflected a deficiency in the recognition of mentoring's reciprocal value. Mentors failed to perceive the benefits of organizational recognition and improved job performance through fresh perspectives (Allen et al., 1997). This absence of a reciprocal growth mindset reinforced the idea that mentoring was an unilateral burden, eroding the trust required for effective counseling and acceptance and confirmation. In summary, mentee passivity and mentor competitive mindsets undermine the trust and reciprocity that developmental guidance requires.

The most profound structural constraints were imposed by the unique context of the Chinese technology industry, characterized by high pace. China's business ecosystem was characterized by an exceptionally fast pace, with companies built in three to five years versus five to eight years in the US (Chen & Su, 2025). This acceleration came from intense competition fueled by a large population, government support, and a pragmatic approach that prioritizes rapid delivery over perfectionism, embodying the "80/20 rule," where speed often exceeded refinement (Potapova & Frattini, 2024; Topolsky, 2018). The rapid development pace brought continuous delivery deadlines to designers, leaving limited time for reflection on design outcomes and engagement in mentoring activities. Moreover, this accelerated pace left no time to develop out-of-the-box ideas, limiting the fresh perspectives that novice designers typically bring to the design team. In summary, the delivery pressure transform the mentor from a developmental guide into a project gatekeeper, replacing graduated exposure with risk-controlled task restriction.

Our findings revealed that Chinese design education was prone to passive learning and tool-centricity, aligning with the results of previous research. Design education in China followed traditional pedagogical approaches that emphasized knowledge transfer and technical skills rather than application. This pedagogical orientation cultivated predominantly passive learning mindsets among design students, limiting their capacity for independent exploration and creative problem-solving. Consequently, a gap emerged between academic training and professional practice, affecting how novices transition to senior roles and their confidence in professional settings (Huang et al., 2021). Such tool-centric curricula also limit mentees' development of integrative thinking, which is necessary for fully benefiting from mentor guidance. Taken together, these interacting roots collectively explain why the mentoring relationship in Chinese design team diverges from the knowledge transfer process that the novice-expert and traditional apprenticeship models describe.

5.3. Design implication

5.3.1. Toward information accessibility: Enhancing domain knowledge transfer

This implication addressed the need to enhance mentee onboarding and facilitated design task execution, which were currently hampered by fragmented and selectively shared domain knowledge.

Organizational newcomers need to acquire specific domain knowledge (Yang et al., 2019), yet our findings confirmed that mentors often transmitted partial information, creating an information hierarchy that impeded contextual understanding. To address hierarchical knowledge transfer challenges, we recommended implementing shared knowledge repository technologies that centralize project-related documentation and mentoring best practices. Recognizing the time burden on mentors for externalizing knowledge, we draw inspiration from prior work suggesting that AI technologies can automatically capture and construct knowledge from everyday work activities, creating an externalized, shared database (Lindley & Wilkins, 2023). This approach reduced the burden on mentors while democratizing access to domain knowledge.

Building upon this repository, the large volume of information necessitated AI-assisted information retrieval, enabling just-in-time information utilization. Furthermore, previous research demonstrated that knowledge network technologies could similarly support information acquisition by mapping knowledge to its keepers, thereby guiding purposeful interpersonal communication aimed at information retrieval (Osinski & Rummel, 2019; Yang et al., 2019). Beyond internal repositories, we recommended creating online knowledge-sharing communities to transcend organizational boundaries, such as knowledge sharing platform created by the Nielsen Norman Group.[4] Previous research has identified several barriers to knowledge sharing within these communities, including time and effort requirements and cognitive overload resulting from numerous information systems. Addressing these barriers necessitates the development of user-friendly integrated information-sharing platforms and the cultivation of a community environment that encourages knowledge sharing through mechanisms such as acknowledgment and praise (Lin et al., 2014; Vuori & Okkonen, 2012; Yang & Wang, 2019). This strategy of combining repositories, online communities, and AI-assited retrieval could enhance knowledge transfer efficiency while reducing mentor knowledge transfer workload.

5.3.2. Toward intelligent mentorship: Reducing mentorship burden

This implication focuses on alleviating the insufficient time challenge observed in the relationship and growth dimensions by leveraging technology, addressing features proposed for design task execution and progress alignment.

Our research identified insufficient instructional time as a key challenge. AI-powered knowledge platforms offer promising solutions to reduce the mentor's knowledge transfer workload. Participants' proposals for an AI mentor capable of supporting onboarding, responding to real-time queries, and evaluating design outputs suggest AI can substitute the knowledge transmission aspects of mentoring. These AI features directly alleviate the mentee's fear of asking questions, addressing a critical psychosocial deficit by offering a "zero-risk confidant."

Beyond substitution, AI should be used for intelligent augmentation. Echoing previous research, our participants suggested leveraging AI to observe mentees and alert mentors when assistance is needed (Han et al., 2025). This proactive approach, coupled with AI-recommended personalized mentoring approaches based on knowledge bases (Wei, 2024), provides contextually relevant and timely guidance, transforming the passive relationship dynamic into an adaptive one. Additionally, to combat the workload concentration of the one-to-one model, we recommend utilizing Community of Practice (CoP) structures to distribute mentorship responsibilities (Campbell et al., 2016; Evans et al., 2017; UC Davis Health, 2015; Striner et al., 2022). This integrated approach leverages AI to replace knowledge transmission, uses CoP to distribute responsibilities, and applies AI to enhance the remaining core mentor-mentee relationship.

5.3.3. Toward enhanced design outcomes: Cultivating mentee design thinking

This final implication addresses challenges related to quality assurance and personalized pathways, aiming to balance the quality of deliverables with the cultivation of the mentee's design thinking.

Participants specifically conceptualized AI-based quality control features for design outputs, aligning with prior research on AI evaluators. We recommend a two-mode AI evaluation system: standards-based assessment (using established design systems) and knowledge-based assessment (leveraging general design principles) (Duan et al., 2024; Shaer et al., 2024). This automated feedback loop could reduce the mentor's review burden while empowering mentees to self-assess their deliverables before human review.

To address the core issue of lack of critical thinking, technology must constrain mentee utilization patterns. Inspired by structured AI utilization work (Chen et al., 2024), we recommend that technological support for design activities be constrained by mentor-defined problem-solving processes. This involves embedding AI capabilities within structured workflows (e.g., source-benefits-application) to cultivate the methodical thinking patterns necessary for design expertise. Finally, to guide personalized pathways, the system need to leverage AI to structure and track the mentee's growth by providing professional development frameworks and recommending specific learning tutorials based on identified knowledge gaps.

5.3.4. Potential ethical concerns

Although technology-supported mentoring features may reduce mentors' workload and provide timely guidance for mentees, the integration of AI also introduces some ethical risks. First, features such as activity tracking, and communication analysis require continuous access to designers' work processes and interactions, which may compromise privacy and data security if not carefully governed (Ghosh, 2025).

Second, AI-based recommendation and evaluation systems may embed historical, organizational, or social biases present in training data and assessment criteria (Said, 2024). When personalized learning paths or output feedback are generated based on past records, these systems may favor certain working patterns or output styles, while marginalizing alternative approaches. In particular, automated quality assessment may privilege standardized criteria, reinforcing rigid norms and overlooking qualities such as context-sensitive.

Third, extensive reliance on AI-mediated feedback and guidance may weaken mentors' and mentees' autonomy and reflective judgment (Ghosh, 2025). When critical decisions, evaluations, and learning paths are increasingly delegated to algorithmic systems, mentors may become over-reliant on automated recommendations, while mentees may hesitate to experiment or seek clarification beyond system-provided feedback. These risks highlight the importance of foregrounding transparency, informed consent, and human-in-the-loop mechanisms in the design of AI-supported mentoring systems. Technological support should be positioned as an aid to human judgment rather than a substitute.

6. Limitations and future work

While this study provides valuable insights into mentoring practices and challenges in the Chinese design industry, several limitations should be acknowledged. First, our methodological approach primarily employed in-depth interviews, which provided rich qualitative insights. However, our sample coverage remains limited in company size and industry sectors. Future research could employ complementary quantitative methods, such as large-scale surveys, to verify the applicability of our findings across the broader design industry.

Second, our data collection relied predominantly on participants' retrospections and reflections of their mentoring or being mentored practices, which may introduce recall biases and deviate from their workplace behaviors. Future studies could incorporate on-site observations to capture mentoring dynamics as they unfold naturally, thereby complementing self-reported data and providing a comprehensive understanding of mentoring interactions in practical work contexts.

Third, as mentoring interaction occurs within professional environments, and our participants were all practicing designers, our findings primarily reflect organizational perspectives. However, the formation of these mentoring dynamics is also influenced by educational and societal factors. While our participants provided some insights into these dimensions based on their experiences, future work should involve additional stakeholders, such as design educators and industry leaders, to develop a more holistic understanding of the factors shaping these mentoring relationships and how various entities can better support them.

7. Conclusion

This study examines the current practices and challenges of mentoring relationship in Chinese design teams, enabling us to identify effective technological support mechanisms for this crucial relationship. Through interviews with designers mentoring others or being mentored, we identified three key areas. First, current mentoring practices revealed a profound bifurcation of Kram's framework: career functions were heavily instrumentalized to serve project efficiency, while psychosocial functions suffered a systemic deficit due to a lack of psychological safety. Second, we uncovered the structural roots of functional impairment, which stemmed from the interplay of four primary challenges: individual traits and mindsets, organizational and cultural context, industry and societal trends, and educational background and competence differences. These factors collectively created a fear-driven dynamic and an efficiency-safety paradox. Finally, participants envisioned a technology-augmented mentoring system, proposing a suite of features from AI-assisted onboarding and quality assurance to using AI as a "zero-risk confident" in feedback communication. These features demonstrated a need for technology to both reduce mentor burden and strategically restore relational safety. This study, as the first effort, calls for additional contributions, both empirically and theoretically, to the HCI and CSCW communities in the design of supporting mentoring within the Chinese design industry.

Notes

1. https://weixin.qq.com/
2. https://huaban.com/
3. https://www.midjourney.com/home [Database]
4. https://www.nngroup.com/articles/

Author contributions

CRediT: **Luyao Shen**: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing; **Zhongyue Zhang**: Conceptualization, Formal analysis, Methodology, Visualization, Writing – review & editing; **Qianjie Wei**: Data curation, Formal analysis, Investigation, Visualization, Writing – review & editing; **Lee Lik-Hang**: Conceptualization, Writing – review & editing; **Pan Hui**: Conceptualization, Supervision, Writing – review & editing; **Mingming Fan**: Conceptualization, Funding acquisition, Supervision, Writing – review & editing.

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