Bitkom Jahrbuch Digital Design 2024

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Verantwortliches Bitkom-Gremium

AK Digital User Experience & Design

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From Commands to Conversations: Rethinking Software Training for the Era of AI Chatbots

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From Commands to Conversations: Rethinking Software Training for the Era of AI Chatbots

Stefan Holtel, PricewaterhouseCoopers

Abstract

The rise of intentdriven AI systems like ChatGPT marks a turning point in how humans and machines interact, shifting from command-based interfaces to fluid, natural language dialogues. This transformation enhances accessibility and efficiency but significantly increases cognitive demands on users. Tracing the evolution of human-computer interaction from the basic responses of ELIZA to today's sophisticated generative AI, this essay highlights the challenges posed by gaps in user literacy, critical thinking, and metaphor comprehension. By addressing these challenges, it outlines essential strategies for future software training to empower users in the era of AI-driven communication.

Quaint Technology: A 23$_{rd}$-Century Perspective

In the dim light of a small, glass-walled office from the 1980s, Scotty, the brilliant engineer of the 23$_{rd}$-century starship Enterprise, stands in front of a gray CRT monitor. Beside him, a bemused engineer colleague from the present day observes his apparent ease as he confidently picks up the computer's mouse. A self-assured smile flickers across Scotty's face as he holds the mouse like a microphone and speaks into it. »Computer?« he asks expectantly, his tone implying he anticipates immediate response. But nothing happens. Scotty frowns, bringing the mouse closer to his mouth and repeating more firmly, »Computer!« His colleague, visibly amused, gestures toward the unmoving cursor on the screen. »Uh, maybe ... try this?« he suggests, pointing to the mouse without finishing his sentence. Scotty glances down at the small device in his hand, which appears to him as a primitive artifact, and remarks with disdain, »How quaint!« Finally, he uses the mouse as intended, navigating the user interface with a mix of disappointment and confusion.

This iconic scene from **Star Trek IV: The Voyage Home** underscores a paradigm shift in human-computer interaction—a transition that feels particularly relevant today. In the 23$_{rd}$ century, voice has become an intuitive and seamless form of machine interac-

tion. In stark contrast, the 1980s saw the graphical user interface dominate, with mouse and keyboard serving as the primary tools for computer operation.

The standards of the past often seem outdated, while technologies of the future appear effortlessly natural. That strikes at the core of how technological paradigms shape expectations and perceptions, prompting us to consider what the future holds as we experience a significant leap in human-computer interaction ourselves today: The recent surge in chatbot capabilities marks the culmination of technical development, reflecting a long and sometimes stumbling journey in the evolution of conversational interfaces. It invites us to explore the profound shifts in how we engage with machines and imagine the possibilities of what comes next.

Voice is the Limit: From ELIZA to ChatGPT

We are in the third year of a technological revolution, only comparable to the introduction of the steam engine and electricity. Now, chatbots mark a breakthrough in human-machine communication. That journey began in 1966 with Weizenbaum's ELIZA, a program simulating a Rogerian psychotherapist using pattern matching.[1] Despite its simplicity, ELIZA evoked emotional connections, exemplified by a secretary who sought privacy to interact with it. By 1972, Kenneth Colby's PARRY simulated paranoid schizophrenia so effectively that psychiatrists often failed to distinguish it from real patients. In the late 1980s, Rollo Carpenter's Jabberwacky shifted from rigid scripts to mimicking natural dialogues, setting the stage for modern AI. Richard Wallace's ALICE, launched in 1995, utilized advanced scripting to enable extended conversations. By the 2000s, chatbots had evolved into practical business tools, and virtual assistants like Siri, introduced in 2011, brought them into mainstream usage. However, they remained primarily office tools until the release of ChatGPT in late 2022, which revolutionized the field. ChatGPT's ability to generate nuanced, creative responses across diverse topics without dedicated training marked a watershed moment. This versatility sparked a »Cambrian Explosion« of applications, embedding AI into everyday life. Yet, this leap is more than a technological milestone; it represents a shift from executing commands to understanding intentions—ushering the next stage of human-computer interaction.

From Clicks to Intentions

To appreciate the significance of this leap, we must trace the origins of computing back to the 1940s. Progress since then has extended far beyond advancements in hardware architecture; even the user interface has undergone already two transformative shift – each fundamentally redefining how humans interact with machines. The launch of ChatGPT marked the third of such a pivotal moment, opening a new era of computing. For countless individuals, ChatGPT offered their first immersive and tangible encounter with AI. Therefore, it is essential to understand the relevance and nuances of this paradigm shift.

1 (Weizenbaum, 1966)

Following user experience expert Jacob Nielsen, the history of human-computer interfaces started **with batch processing** (1940s–1960s), **followed by command-based interactions** (1960s–2022), and since the beginning of 2023 it evolved into **intent-based outcome specifications** (Table 1).[2] How did those differentiate, and why had each been such a big change of perspective in computer user interfaces?

Batch Processing	Commands	Intentions
1940s–1960s	1960s–2022	2023
prepared processing	vocabulary of commands	human language
delayed execution	single command	text phrase
dedicated result	command and confirmation	open dialogue

Tabelle 1: Three Paradigms of Human-Computer Interaction

In the early days of computing, users employed batch processing to execute tasks. This involved preparing a batch file containing a series of commands, which the system processed without user intervention. For instance, to print a document, a user would create a batch file with the following content: '@echo off, print C:\Documents\Report.txt'. This script directed the system to print 'Report.txt' located in the 'Documents' directory. Beforehand the user had to ensure the accuracy of the file path and command syntax, as any error would result in failure without a chance for immediate feedback.

The advent of command-line interfaces allowed users to interact with the system in real-time, entering commands and receiving almost immediate responses. In the operating system MS-DOS e. g., printing a file involved typing a command directly into the command line interface: 'print C:\Documents\Report.txt'. This approach provided direct feedback, enabling users to correct errors 'promptly'. However, it still required precise knowledge of command syntax and file paths.

In the early 1980s Windows introduced a graphical user interface, allowing users to perform tasks like printing through interaction with intuitive visuals like buttons, check lists, and scroll bars. To print a file, a user would open the 'Documents' folder, locate and right-click on an icon named 'Report.txt', and select 'Print' from the Windows context menu. It is notable while this process was more intuitive, it remained within the command line interface paradigm, as users executed predefined commands with an expected outcome–although through graphical elements.

2 (Nielsen, 2023)

But AI is introducing a totally different paradigm. Users are forced to specify their desired outcomes without detailing the steps to achieve them. In this model, a user might instruct the system: ‘Print the latest report’ or ‘Print the report I fixed yesterday’ or ‘Print the report with format in CI style’. Possible instruction phrases could be endless. The AI interprets its intent, identifies 'Report.txt' as the document matching the selection criteria, and executes the printing process autonomously. For short or long, imagination capabilities of a user will become much more important than processing capabilities of the computer.

Reflecting on over 80 years of computing history, there have been three paradigm shifts in human-computer interaction. But only this most recent shift feels revolutionary, does it? The answer lies in a fundamental reorientation and change of perspective – from systems requiring explicit, machine-focused directives to those processing intuitive, purpose-centered dialogues. This shift toward human beings has not only redefined the way we interact with technology. It also expands the boundaries of what machines can achieve in partnership with humans. The user focus wanders from ‘how’ tasks are performed to ‘what’ s/he wants to accomplish – luckily reducing the need for technical knowledge, but unfortunately leading to a different set of mandatory skills.

At first glance, the difference between the second and third paradigm of human-computer interaction seems to appear marginal: both are rooted in command-line interfaces – formerly represented by that little, green, blinking cursor awaiting user input, today framed by a command line box that eagerly awaits text input. It appears to serve the same purpose – perhaps more intuitively and efficiently executed in the latest iteration. However, a closer examination reveals why this purportedly minor shift in interface design leads to a profound cognitive challenge: Users are no longer simply entering predefined commands! Now, they are required to articulate intents with precision, deeply reflect on motivations, and describe desired outcomes as accurately as possible in their own language. While chatbots have the capacity to accomplish almost anything, they inherently lack any form of desire! In essence, users have been handed Alibaba's genie’s lamp, yet they now face the formidable challenge of defining and articulating their wishes – an exercise requiring unprecedented clarity, introspection, and decisive action.

Interactive Over Instructive Engagements

Natural language interfaces promise to make technology intuitive and accessible by enabling natural conversations rather than rigid, mechanical inputs. For decades, voice has been lauded for making technology more intuitive and accessible through natural conversations, but there is a twist: While speech-enabled interaction increases effectiveness in interaction, so far this can only be predominantly observed in ‘instructive’ engagements with user devices (Table 2): tasks such as setting alarms, checking the weather, or playing music are well-suited to voice commands. Surveys prove that over half of Germans (53 percent) use voice assistants like Siri and Alexa, but

primarily for playing audio content (89 percent), making calls, and controlling smart home devices (75 percent each).[3] Those require simple and straightforward inputs.

The new generation of generative AI systems operates on a fundamentally different terrain. Users face significant usability challenges with tools like ChatGPT because these rely on 'interactive' engagements, grounded in prose-based prompts and turn-taking dialogues.[4] What we are witnessing here is an embodiment of Speech Act Theory,[5] a theory formally encapsulating the principles of human-to-human dialogues. While this empowers skilled users to achieve their desired outcomes efficiently, it presents considerable difficulties for many others. A significant portion of users may struggle to articulate their needs effectively when interacting with AI through written prompts. This challenge arises because the technology 'digs yet another layer deeper into the process through which thoughts are conceived, formed, and expressed in the human mind.'[6]

	Instructions	Interactions
Definition	involves predefined, finite commands	requires undefined, infinite dialogues
Examples	▪ set an alarm ▪ check the weather ▪ play music	▪ book a multi-leg flight ▪ manage personal finances ▪ demand technical support
User Input Complexity	minimal user input and simple commands	detailed user input and precise articulation of intent
Error Tolerance	spelling errors with limited impact; can be easily corrected	phrasing errors can lead to profound misunderstandings

Tabelle 2: Instructive vs Interactive Engagements with Devices

Considering that a chatbot interface at first glance functions as a command-line interface, the lack of visual elements can make ‘navigating’ the unfolding of a human-machine dialogue particularly challenging, often resulting in confusion, frustration, and errors. Software engineer Jules White puts it this way: ‘If I can’t figure out how to translate my original goal into the actions in the tool, the tool is dead and useless to me’.[7]

For example, conducting in-depth searches or handling multi-step inquiries can become arduous without the necessary cognitive skills and mental frameworks to support such tasks. Effectively utilizing voice interfaces for complex interactions with sophisticated chatbots today necessitates users must clearly articulate their needs and deeply understand the system's intermediary responses. Voice interfaces usually enhance user experience only for simple tasks – in more complex scenarios the cognitive load comes to the user.

There seems to grow a new paradox: The more a machine will be capable to simulate and mirror human-like communication, the more users must learn to express their will and intentions in their mother language. As text-based interfaces now reshape human-computer interaction for the decades to come, their promise of inclusivity seems to be tempered by significant usability

3 (BITKOM, 2024)
4 (Schulhoff, et al., 2024)
5 (Austin, 1975)
6 (The Atlantic, 2024)
7 (White, 2024)

challenges. While instructive tasks benefit from simplicity, interactive engagements expose barriers rooted in articulation and comprehension. We must ask whether potential users are already prepared and have the necessary skills to exploit future computing devices.

Can we determine those prerequisites to initiate and facilitate talks with sophisticated chatbots? Frankly, they are known and elaborated for decades under the umbrella term 'critical thinking'.[8] However, there is a notable gap between the demand for these skills and their availability in the workforce.

A 2011 survey of 2,000 U.S. companies already revealed that two-thirds (sic!) reported a skills mismatch, indicating that many workers lack the competencies required by employers.[9] Why are they that relevant to exploit chatbot capabilities?

Critical Thinking Gap

Albert Einstein is often attributed with the quote: 'If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions.' This encapsulates the essence of critical thinking. In their haste to find solutions, people often overlook the problem itself, leading to unreliable solutions, frustration – and the emergence of new problems. Critical thinking, therefore, can be defined as a disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information to guide belief and action from a profound root cause analysis.[10] When applied to workforce upskilling, critical thinking can be distilled into three key components: analytical thinking, creative thinking, and – particularly in the context of intelligent chatbots – proficiency in AI and big data. According to World Economic Forum, these skills will be among the most in-demand by 2027.[11] However, despite the pressing need for these skills, the report highlights a concerning gap: while six in ten workers will require training, only half currently have access to adequate opportunities for skill development.

Critical thinking skills can be considered the core competence to make efficient use of ChatGPT and other AI tools. It is the cognitive keystone required to effectively engage with AI systems, because those demand clear articulation of intent and comprehension of nuanced responses. The World Bank emphasizes the need for comprehensive skill sets, including foundational literacy and numeracy, as well as problem-solving, communication, and information analysis, to succeed in a 21st century labor market.[12] The role of chatbots will not a replacement of thinking in the future, but they will emerge as 'placebos' to stimulate thinking for the better.

8 (Paul & Elder, 2005)
9 (Burrus, et al., 2013)
10 (Paul & Elder, 2005)
11 (World Economic Forum, 2023)
12 (World Bank, 2024)

Nevertheless, critical thinking does not emerge in isolation. Its prerequisite is rooted in general literacy. Only through robust literacy can individuals gain the essential skills to read, interpret, and analyze information – prerequisites for the reflective processes that form the basis of critical thinking. This raises an important question: how well are we equipped with literacy as a pillar of critical thinking? The answer here is – to borrow and adapt a famous quote from science fiction author William Gibson: 'Literacy is already here – but it is not evenly distributed.'

Articulation Barriers Ahead

Literacy can be considered as one of the most important skills necessary in a knowledge-driven world. It enables individuals to engage in society and economy, access information for their needs, or pursue personal and professional goals. With the advent of AI-enabled computer systems, general literacy will become the one skill that will outpace many others. Only literacy fosters the ability to recognize patterns, draw inferences, and construct arguments, all of which are crucial when designed for chatbots that respond dynamically. Engaging in turn-taking dialogues with AI systems requires not only a grasp of language but also the cognitive flexibility to refine inputs and evaluate responses quickly. Without literacy, users will not bridge the gap between intent and execution, leaving them incapable to leverage the potential from advanced AI tools.

Thus, the degree of literacy becomes essential in the future. How well-equipped people are for such a scenario? For Germany e. g., the so-called LEO Survey provides a framework for distinguishing four literacy skills called »Alpha Levels«.[13] At Alpha Level 1, individuals possess minimal literacy skills, primarily limited to recognizing individual letters. They can identify and name letters but mostly struggle to form words or even comprehend written text. This level indicates a significant barrier to reading and writing. Approximately 0.6 percent of the adult population falls into this category, equating to about 300.000 adults. Individuals at Alpha Level 2 can read and write individual words but struggle with constructing or understanding full sentences. They may read common words by sight but often need to decode words letter by letter. This limitation affects their ability to engage with written materials beyond isolated words. They fail at the level of sentences. Around 3.4 percent of adults are at this level, totaling approximately 1.7 million individuals.

Literacy Rates in Germany

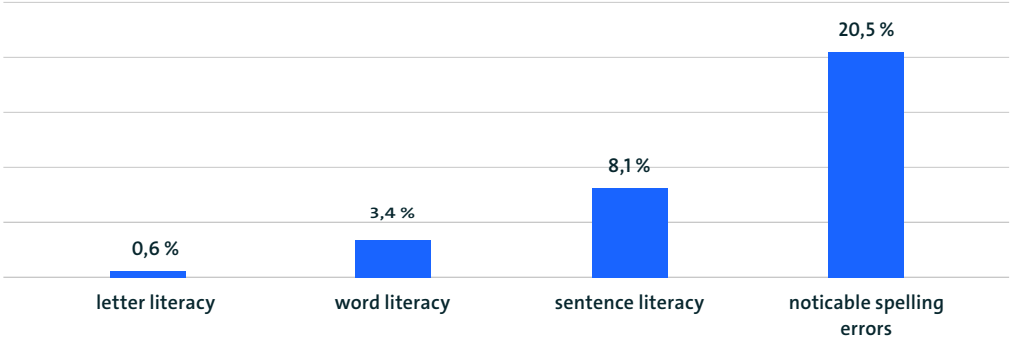

Tabelle 3: Literacy Rates in Germany

13 (Grotlüschen, et al., 2020)

At Alpha Level 3, individuals can read and write simple sentences but encounter difficulties when dealing with longer or more complex texts. They can understand straightforward information but may struggle with tasks requiring the integration of information from multiple sentences or paragraphs, sufficient for some daily activities but inadequate for more demanding reading and writing tasks. About 8.1 percent of adults are classified here, amounting to roughly 4.2 million people. Individuals at Alpha Level 4 can engage with coherent texts but exhibit noticeable spelling errors, even with common and simple vocabulary. While they can process longer texts this level suggests that individuals can participate in more complex literacy tasks but may require additional support to enhance their proficiency. This level includes 20.5 percent of the adult population, which is about 10.6 million individuals.

Will it matter that about 12 percent of German-speaking adults (approximately 6.2 million people) have low literacy skills and 20 percent are not that good in grammar? At least, we are told over and over that AI-driven chatbots will make some progress in better guessing and facilitating human intention, thriving for all our wishes. Unfortunately, this will not be the case at all. Mitigating spelling errors will not help unveiling hidden intentions or subconscious motivational drivers. Superior literacy will be the unique enabler of critical thinking and for navigating the complexities of AI-driven interactions effectively. Without sufficient literacy, users will be lost in chatbot interaction because they cannot express themselves. Law experts e. g. already envision this for their profession: 'AI won't replace lawyers, but lawyers who use AI will replace lawyers who don't.'[14] Without an effort to push general literacy skills, we might even have to reconsider our understanding of the term 'digital divide' at all and why general literacy will make such a huge difference.[15]

But beyond sufficient literacy, another challenge in facilitating seamless interaction with AI chatbots is our entrenched reliance on dedicated computer language metaphors.

Metaphor Obsolescence

In the evolution of computing interfaces, metaphors have played a crucial role in making technology accessible.[16] However, as interfaces advance, certain metaphors become outdated. For instance, early operating systems like DOS utilized 'commands' that users typed to perform tasks. This approach required users to memorize exact commands, which was efficient for experienced users but posed a steep learning curve for novices. The introduction of graphical user interfaces in systems like Microsoft Windows brought the 'desktop metaphor,' where the computer screen emulated a physical desk.[17] Elements such as 'folders' and 'files' represented digital documents, and a 'trash can' symbolized deleted items. This design aimed to provide a familiar environment, easing the transition for users from physical to digital workspaces.

14 (Pierce & Goutos, 2024)
15 (Warschauer, 2002)
16 (Carroll & Thomas, 1982)
17 (de Bruin, 2022)

It is notable to say that one of the strongest metaphors that become obsolete with AI-driven chatbots is a somehow weird one: 'People expect computers to be objective and consistent'.[18]

With the advent of natural language interfaces, these longstanding metaphors may no longer suffice – and even hinder progress. Language-driven interfaces do not conform anymore to the visual and spatial metaphors of graphical user interfaces. Addressing this 'curse of wrong metaphors' requires reconceptualizing language interfaces in our minds as tools with unique strengths and limitations.

The sudden decline in the relevance of traditional metaphors carries significant implications for our ability to engage effectively with devices in the AI-enabled era. One major challenge lies in education, as training programs relying on outdated metaphors struggle to impart current best practices for AI chatbots, leaving participants ill-prepared to navigate modern technological landscapes. Furthermore, interpretative gaps arise as these outdated metaphors lose their clarity, resulting in a lack of coherent frameworks that can foster understanding. This creates vulnerabilities, increasing the risk of misinformation and exploitation.

Finally, the transitional uncertainty during this shift poses another concern. As users move away from obsolete metaphors, there will be a period of confusion where new standards and practices remain underdeveloped while outdated ones persist, hindering progress and quick adaptation.

Contrary to prevailing assumptions, the progression of AI systems toward greater ease of user interaction will be only gradual. A more significant challenge lies in the requisite development of skills largely not necessary during the second user interface paradigm: the ability of users to articulate their own thinking, critically reflect intentions, and achieve a nuanced understanding of their motivations and key drivers.

The evolution of AI necessitates a paradigm shift in how humans engage with technology. Beyond the obsolescence of established metaphors, the advent of AI introduces profound challenges and opportunities that transcend traditional user interface frameworks. That calls for a reimagination of software training.

Chatbot Training as Terra Incognita

A Gartner Group survey recently revealed that 85 percent of business leaders believe AI and digital trends will significantly increase the demand for skills development within the next three years.[19] But the obsolescence of foundational software metaphors that have shaped computer science training and best practices for decades have profound implications for IT training and development tomorrow. Traditional training programs – effective in teaching software features – now obviously fail to meet intended objectives, leaving participants dissatisfied and especially unable to apply new skills of exploiting language models in practice.

18 (The Atlantic, 2024)
19 (Gartner Group, 2024)

For example, if someone isn't used to phrase his/her problem in a clear manner, a tool without a pre-defined, intended feature set will not help. AI-chatbots do not implicitly guide the thinking process of a user anymore. If s/he does not for alone, nobody will. Software engineer Jules White states this dilemma as: 'People [...] aren't used to explaining problem solving strategies and guardrails to their current dead software tools.'[20]

What does this mean for this new class of AI-driven software and hardware? Computer builder Intel made a surprising discovery recently: A survey concluded that user performance on 'AI-enabled' notebooks had been lower (sic!) than on classic designs.[21] The researchers speculated that this has been to insufficient training – but it could even be about the wrong training at all. As noted in a study on obsolescence in IT work,[22] continuous training is essential to prevent employees from becoming obsolete and stressed. It has to fit the new needs.

This shift creates a vacuum in interpretative frameworks, which opportunists may exploit for quick financial gains. The resulting environment resembles a 'Wild West' scenario, where the emergence of new, effective software training standards remains chaotic and unregulated – the paradigm shift is such groundbreaking that it will take time to adapt. Boston Consulting Group e. g. expects 'training to continue moving away from classroom instruction toward on-the-job models,'[23] which would quite well fit with the peculiar needs of exploiting chatbot capabilities directly on job duties than in classroom settings.

During this transitional period, organizations must navigate a landscape filled with promises, unproven methodologies and conflicting guidance, making it challenging to establish reliable and effective training programs.

A strategic approach to obsolescence management is crucial in such times to reduce that burden and ensure the sustainability of training programs. Organizations must critically evaluate training providers and methodologies, lurking for evidence-based approaches that will align with those most recent technological advancements. Which criteria will make a future software training fit for addressing the unprecedented needs of the chatbot era?

1. **Suitable Metaphors:** The foundation of effective chatbot training lies in applying such metaphors that easily resonate with users' mental models. Those should simplify complex technologies and help learners conceptualize how chatbots function and integrate into their mental workflows.[24] A new category of metaphors must empower users to make easily use of intricate chatbots capabilities, facilitating intuitive turn-taking dialogues and utilization. By creating relatable and robust analogies, learners will better understand and adapt to the novel paradigms introduced by AI technologies.

2. **Adaptability over Functionality:** Traditional software training heavily focuses on functionality – teaching users what a system can do to perform predefined tasks. With chatbots, that focus shifts on immediate adaptability: Attendees should be trained to leverage chatbot capabilities for cognitive tasks emerging from their own understanding, e. g. emphasizing the

20 (White, 2024)
21 (Intel, 2024)
22 (Cigref, 2021)
23 (Boston Consulting Group, 2024)
24 (Holtel, 2024)

process of identifying, articulating, and solving complex problems. For example, training programs can introduce frameworks like Chevallier and Enders' problem-solving methodologies to help users dissect complex challenges and exploit them with chatbot capabilities.[25] Only by prioritizing critical thinking over rote memorization, chatbot trainings will empower users to make chatbots their cognitive aids. It is likely that we will see the advent of a breed of training methodologies becoming more relevant for training like e. g. NASA Task Load Index[26] (measuring cognitive and emotional effort), Cognitive Task Analysis[27] (break down tasks into manageable steps), or Job Crafting[28] (reimagine a given job profile). The success of such trainings will lie in its ability to actively engage participants.

3. **Evaluated Effectiveness:** A critical step is to assess the limitations of existing training programs for that new software era and highlight their inefficiencies. Current methods often fail to close the gap between theoretical learning and practical application—leaving users underprepared for real-world challenges. Microsoft research e. g. indicates that users begin to recognize the value of AI tools only after saving 11 minutes daily over an 11-week period, leading to notable enhancements in productivity, which makes it a challenge to encourage enduring AI habits.[29] Organizations must take control by defining new measures of training success that prioritize immediate and tangible benefits. Training should focus on eliminating the 'theory-practice gap,' ensuring participants can directly apply what they learn. This involves addressing intrinsic motivation, enabling users to see immediate value and relevance of training in their day-to-day work.

Addressing these guidelines may require a significant departure from conventional training strategies and the well-trodden paths of digital training. The goal of digital trainings from now on is not just to teach how to use tool features but how to empower users to exploit them creatively and effectively, adapting their own critical thinking skills to human-computer interaction with competence and confidence.

Towards a Linguistic Turn

It is worthwhile reflecting on parallels between the evolution of human-computer interaction and another cultural transformation of our time, the uprising of the 'iconic turn,' which highlighted the shift toward image-centric modes of seeing and interpreting the world.[30] In the computing realm this transformation was heralded by the advent of graphical user interfaces. Symbols, windows, and visual hierarchies replaced abstract commands and codes of earlier systems, images became more than the 'vessels' of information, they emerged to dedicated tools for interaction.

25 (Chevallier & Enders, 2022)
26 (Hart, 2006)
27 (Crandall, et al., 2006)
28 (Wrzesnieski & Dutton, 2001)
29 (Microsoft, 2024)
30 (Burda & Maar, 2005)

Today, we are taking another step of a phenomenon called 'linguistic turn,' driven by the latest advancements in human-computer interaction.[31] Where traditional computing relied on explicit commands – whether through command-line interfaces or mouse clicks – developments in AI have introduced a dialogical relationship between humans and machines. Computers are no longer merely instructed, they are 'spoken to,' becoming serious intellectual human counterparts. Conversing with an AI system, whether via spoken language or text-based dialogue, will increasingly replace the fragile, mechanical input devices and pre-set software features of the past.

This further transition from image to language represents both an extension and a reorientation of the original iconic turn. Linguistic interaction with computers emphasizes not only intuitive usability but also a return to the fundamental form of human communication – conversation. Jacob Nielsen highlighted the urgency of this paradigm shift by stating, 'This primitive level of AI will soon be relegated to the dustbin of history.'[32] As machines quickly evolve from mere tools to conversation partners, this transformation entails nothing less than a redefinition of human identity in the digital age.

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31 (McFarland, 2023)
32 (Nielsen, 2024)

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