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AI agents, wearable computing and the future of postsecondary learning

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This opinion article anticipates another turn in emergent AI applications and presupposes the cultural adaptation that will be required for postsecondary educators. First, AI will be further incorporated in learning environments by advances in wearable computing. Personal devices, often wearable, will be largely hidden or added in subtle ways to people's bodies or clothing, and designed for augmenting cognitive tasks. Second, sophisticated, work-capable AI agents are emerging; innovation is moving past chatbots and generative AI to AI agentive assistants that are designed to "help" people in highly personal and specific tasks. Simply put, AI agents designed to "work" for humans, will be in close communication with our students. Taken together, these trends mean that we can expect postsecondary learning environments to change, again.

A speculative design orientation can help one understand how AI continues to alter postsecondary education. Speculative design, a sociocultural research method, allows researchers to surface latent social, political, and pedagogical implications before the technologies are fully realized (Dunne and Raby, 2013; Galloway and Caudwell, 2018). N. Katherine Hayles's orientation to human-computer interaction, also speculative, has for decades rejected a techno-determinist model in favor of human "interpretation", "context" and "meaning" (Amoore and Piotukh, 2019, p. 145). In one interview she explains, "humans are the ones designing, implementing, and over-seeing complex cognitive systems such as high-frequency trading algorithms, [and] neural network architectures" (Amoore and Piotukh, 2019, p. 148). She also rejects naïve techno-optimism and considers that "digital media are leading us as a population toward hyper attention and away from deep attention" (Amoore and Piotukh, 2019, p. 152).

The next section argues four points in support of the argument that postsecondary learning contexts are on the brink of formidable change requiring adaptation to emergent AI technologies.

1 AI and techno-cultural adaptation

First, the effect of generative AI on the automation of writing, composition skills, and creative practices is still taking shape in postsecondary schools. Following the initial shock of OpenAI's first AI chatbot release in 2022, the impact in postsecondary education is still being felt through the experience of rapid change, excessive hype, constant adaptation, and self-questioning on the part of students, instructors and administrators (Pedersen, 2024). Some participants describe positive adaptation. Chris Labash, Associate Professor of Communication and Innovation writes, "2 years ago, my prediction was that humans would use AI with a mixture of rapture and horror... Right now, my colleagues and I are embarking on a research project that couldn't be done without AI" (Pew Research Center, 2025). Others still describe confusion. Clay Shirky,

Vice Provost of Educational Technologies at (NYU) says, “Our problem is that we have two problems. One is figuring out how to encourage our students to adopt creative and helpful uses of AI. The other is figuring out how to discourage them from adopting lazy and harmful uses. Those are both important, but the second one is harder” (Shirky, 2025).

Yet, societal adoption is not so conflicted. One study shows that “half of Americans now use artificial intelligence large language models like ChatGPT, Gemini, Claude and Copilot” (Elon University, 2025). They use them for a plethora of composition tasks, including writing, brainstorming ideas, and creating visual presentations at work and home. But even more significant, they use them for mundane activities (see Figure 1). Sociocultural norms have changed and are changing.

Second, young adults are wearing computing devices. The term “wearable computers” covers a range of digital devices that can be worn, often in the form of accessories such as eyewear or watches or clothing such as shoes or jackets” (Matteucci, 2021, p. 166). Healthcare monitoring wearables have also normalized the idea of personalized data. Biosensors integrate artificial intelligence in smartwatches and fitness trackers for continuous data monitoring (Shajari et al., 2023). Wearables mediate people’s multimodal dataspheres: one study shows that of people aged 18–25, 98% own smartphones and 71% wearables (Shandhi et al., 2024). Students consume multimodal information using personal technologies for their own entertainment and social life as a daily and continuous practice (e.g., video memes, music, messaging apps, generative AI chatbots).

Research has shown the success of AI chatbots and generative AI in asynchronous learning environments, such as Massive Open Online Courses (MOOCs) to maintain student motivation and to support self-regulated learning (Guan et al., 2024; Br  nner and Ebner, 2025). Likewise, there is extensive research on the use of wearables in educational domains and the monitoring of student activities with wearables (Chu et al., 2023; Ferrier et al., 2022; Almusawi et al., 2021; Matteucci, 2021; and Liang et al., 2019). Research on wearable technologies in physical fitness education discusses their positive impact for motivating student engagement and healthy activity (Lolowang et al., 2025; Wang et al., 2021). Other work concentrates on wearables as distractions with student use of devices for off-task or social purposes during class (Flanigan et al., 2022). Nonetheless, I am arguing that companies are pouring research and funds into devices to emphasize sensory enhancement to further monetize these wearables. The issue is that student creative work and the task of *being creative* will be significantly altered because embodied AI agents for sensory enhancements are undergoing normalization.

Third, wearable devices are becoming more personal, designed for continuous use, and can *work* for student learners. Coupled with AI technologies that can “listen” to spoken language, emergent wearables can conduct voice translation, enable simultaneous interpretation and translation across multiple languages, process follow-up questions and provide answers for a student wearer. These wearables are marketed for their subtle usefulness. Natura Umana¹ calls their prototype “HumanPods” and promotes them

as “AI-Powered Earbuds Redefining Personal Assistance.” The advertising campaign sums up the goal, “the most logical hardware choice to provide uninterrupted access to AI.” One journalist expresses the point, “people can share their problems out in the open, and the earbuds listen through the microphone” (Burgo, 2025).

Discussing a wrist-worn “wearable AI” that looks like a stylish bracelet, another journalist explains that it can, “Record everything around you to create an activity log, and then have AI disseminate the information to give you actionable insights and tasks from your day, almost like a personal assistant” (Chokkattu, 2025). Called Bee², it holds a system of microphones working together to capture audio. From a corporate perspective, these wearables are pegged to integrate so seamlessly that users will rarely remove them, providing more profit from data extraction. Although consumer wearables are still partly assumed to be either pedagogically irrelevant or merely distractive, I speculate that they will eventually provide students with substantive forms of cognitive augmentation. They can collect, organize and remember everything said in a classroom.

Fourth, AI virtual assistants like Apple Siri or Amazon Alexa already operate in people’s dataspheres. As Gerard Goggin argues, “mobile technology providers—such as Qualcomm, Samsung, and Apple—have progressively expanded the role and salience of AI in their offerings” (Goggin, 2025, p. 1). Multimodal composition with AI-augmented devices is being assessed by education scholars (Liu et al., 2024; Jin et al., 2025; Ackermann et al., 2025). However, the trend is to construct virtual assistants with further AI agentic capabilities. Returning to the earbuds example, Natura Human explains, “HumanPods give you uninterrupted access to Nature [one of the AI agents], and the rest of your AI People. They are fully compatible with other assistants like Siri or Google, all while delivering a superior audio experience.” One might look at this situation as students having access to a team of AI agents that use their current virtual assistants as a launchpad.

2 Discussion

We need to ask speculative questions on the cultural reach of these designs. One that surfaces is, will instructors lose control over device usage in learning environments or assessments? The form factor for wearable tech is changing. With AI embedded in watches, glasses, bracelets and earbuds, we can speculate that students will have autonomy over their personal devices and their subsequent enhancements.

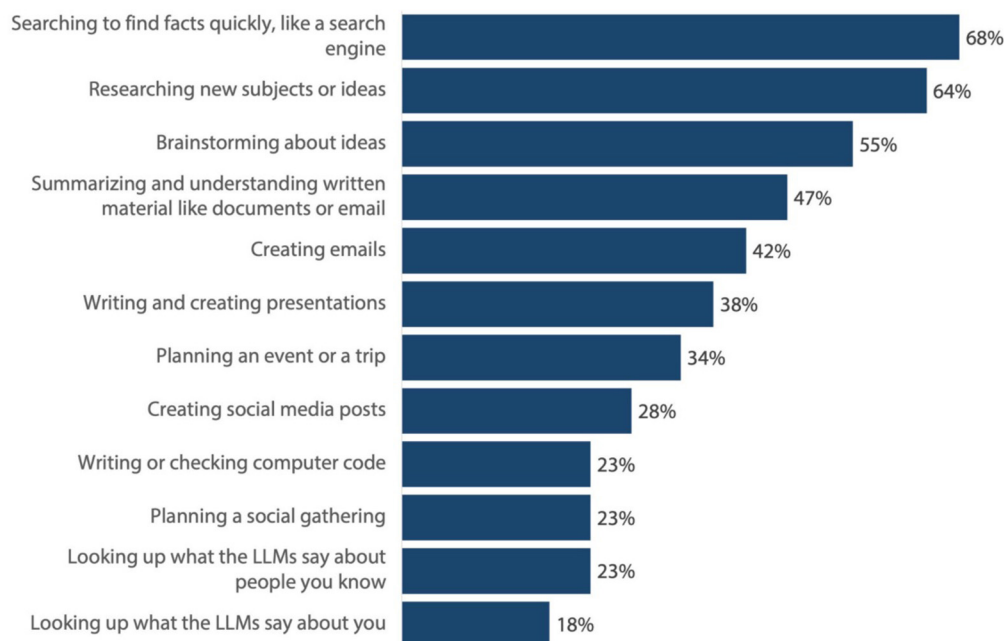
Referring to a previous case study, Hayles says, “activists needed to learn the concepts and vocabulary at issue” (Amoore and Piotukh, 2019, p. 150). We need to imagine learning environments wherein devices are part of our students’ personal lifeworld so that we can empower them. Following Hayles’s theory on cognitive assemblages, students are “forming flexible assemblages that constantly mutate as information is gathered, processed, communicated, stored, and used for additional learning” (Hayles, 2017, p. 119). Building literacies to address unethical AI

1 <https://www.naturaumana.ai>

2 <https://www.bee.computer>

People use AI large language models for these tasks

% of AI large language model users ever use LLMs for these tasks



Source: Elon University Imagining the Digital Future Center survey conducted Jan. 21-23, 2025

FIGURE 1

People use AI large language models for these tasks. *Close Encounters of the AI Kind: The Increasingly Human-Like Way People Are Engaging with Language Models*. Elon University, Imagining the Digital Future Center. <https://imaginingthefuture.org/reports-and-publications/close-encounters-of-the-ai-kind/close-encounters-of-the-ai-kind-main-report/>. Courtesy the Imagining the Digital Future Center at Elon University, Elon, North Carolina. Licensed under Creative Commons by 4.0 Deed. Attribution 4.0 International.

practices due to cultural change will empower post-secondary rights holders.

Students are preparing for future work. Yet, digital divides have been noted by global organizations for rising AI skills adoption rates. For the World Economic Forum, Gabriela Ramos, Assistant Director-General for UNESCO authored an article called, “Why we must act now to close the gender gap in AI.” She notes, women, “are being left behind at every step of the Artificial Intelligence (AI) life cycle” and “concrete policy actions are needed to foster women and girls’ full participation in the digital sector in tandem with holistic responses to systemic gender discrimination.” The article notes that “only 22 per cent of AI professionals are women,” (Ramos, 2022). The International Telecommunication Union (ITU) reports that “in low-income populations, only 21% of women are using [internet technologies], compared to 32% for their male counterparts (International Telecommunication Union, 2024). UNESCO reports AI’s Large Language Models (LLMs) risk marginalizing individuals from “minority groups through representation and deployment biases” (UNESCO, 2024). With emerging forms of wearable AI, digital divides could widen without mitigation.

By speculating on these scenarios, we can authorize students, instructors, and school administrators to demand information about corporate biometric monitoring, significant privacy and access issues, and push for responsible regulation as pedagogy changes. Moreover, speculative design and co-design can help people from disability communities participate, choosing to use or reject them, in postsecondary learning scenarios using appropriate methods (Cockburn et al., 2023).

3 Concluding thoughts

“AI is a generator of texts to which human interpreters assign meanings,” writes scholar and semiotician Marcel Danesi (Danesi, 2024, p. 24). People will always need to learn to communicate and represent meaning through combinations of symbols, *semiosis*. Yet, meaning-making systems are transforming, as are literacy expectations. Educators have gone through profound curricular transformations before. British youth in the Edwardian era were taught to draw, to represent meaning. According to *The National Archives*, learning to draw was deemed a necessary skill. One 1913

report refers to school board inspectors as saying, “characteristics of the best schools of to-day... [would include] history and geography, object teaching and drawing” (Keating, 2009, p. 10-11). Over two hundred years, the camera largely automated “vocational drawing” and simultaneously brought about a renaissance of visual imagery. Countless genres of photographic arts became aspects of postsecondary curricula because of cameras. It would be reckless to omit historic events like the industrial revolution, military technical innovation, and mass global consumerism as factors. However, the point, a speculative one, is that students learning to represent meaning, to create communication artifacts, and to demonstrate those skills will still be mainstays of curricula, even as technologies change.

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Generative AI statement

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