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Building AI Intuition – Four Educational Pillars for Teaching AI in Design at AI+D Lab

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III. p. 12, Chunk 1: AI Literacy for the Long Haul:…
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Chunk 1 In 2023, we outlined our ambition to provide students with an *AI Intuition*—a broad understanding of AI's working principles and limitations.[1] With this intuition, the AI+Design Lab[2] at HfG Schwäbisch Gmünd aimed to provide the knowledge needed to effectively engage with AI at different levels: Students should be able to assess the capabilities of machine learning technologies and models, develop a precise language to communicate AI concepts, decide when to use AI for a design goal based on costs and relevance; they must adopt and build explorative strategies with the technology to work on new applications, use cases, and future scenarios; and, finally, they should be able to critically evaluate societal, ethical, or environmental impacts of implementing AI technologies. With this, our aim has been to prepare students to use AI as design material and a tool—meaningfully—at different stages of their design processes,

1: Flechtner, R., & Stankowski, A. (2023). AI Is Not a Wildcard: Challenges for Integrating AI into the Design Curriculum. *Proceedings of the 5th Annual Symposium on HCI Education*, 72–77. <https://doi.org/10.1145/3587399.3587410>

2: The AI+D Lab: A research group situated between AI, design education, and technology research.

and when to rely on their human intuition. This article details our four educational pillars for building *AI Intuition* and summarizes insights from their implementation over the past three years.

Four Educational Pillars for Building *AI Intuition*

To support *AI intuition*, we defined four educational pillars: (1) improving technical literacy, (2) fostering hands-on exploration, (3) enabling conceptual engagement, and (4) encouraging critical reflection. Building on these pillars, we developed and tested various teaching modules, including introductory materials, self-study assignments, code elements, and custom tools and methods.

Improving Technical Literacy

Having an overview of the broad technical possibilities of AI is essential for practical engagement at the intersection of AI and design. To introduce students to the technical aspects of AI, we created a series of presentations covering a range of topics and complexities: from general overviews of AI technologies and their applications to foundational principles of neural networks, sensor-based AI, image generation models, and large language model (LLM) architectures. We also developed self-study formats that allowed students to explore topics at their own pace—either as preparation for courses or for individual study.

Chunk 2 To introduce students to the fundamentals of machine learning for sensor-based interaction in a playful and explorative way, we developed the role-playing activity *Acting out AI Systems*.[3] Students embodied different components of an AI system.

Chunk 3 By going through the relevant steps for training and inference, they gained a basic understanding of the technology's functionality and limits (Figure 1).

Chunk 4

Figure 1: Students acting as human sensors and recording a data stream of a thermal camera on paper (left). Team members act out the AI algorithm and try to make sense of the data stream (right).

3: Flechtner, R., & Kilian, J. (2024). Making (Non-)Sense—A Playful and Explorative Approach to Teaching AI Intuition for the Design of Sensor-Based Interactions. *Proceedings of the 6th Annual Symposium on HCI Education*, 1–9. <https://doi.org/10.1145/3658619.3658643>

Another approach we developed to introduce students to the functional principles of neural networks is *SandwichNet*.[4] [5] This interactive tool visualizes neural networks in a playful format, allowing students to manipulate the parameters to recreate and understand its learning behavior (Figure 2). The tool includes multiple complexity levels and is used across foundational courses.

Chunk 5

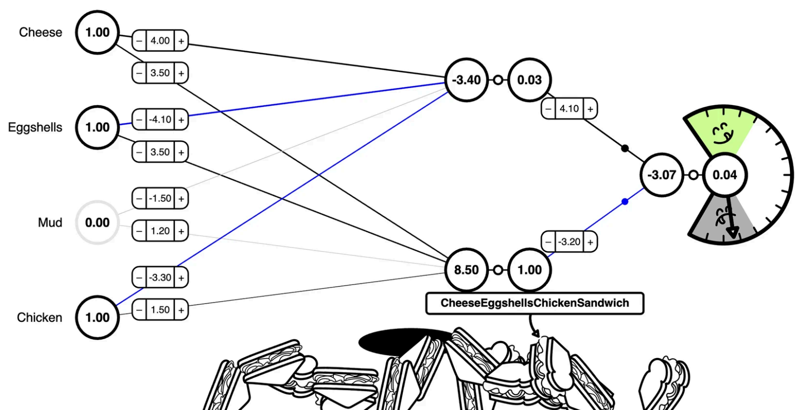


Figure 2: A screenshot of the SandwichNet application. Students are introduced to the basics of neural networks by training SandwichNet to distinguish between edible and inedible sandwiches.

Chunk 6 Fostering Hands-on Exploration

The complexity and non-deterministic nature of AI technologies make them difficult to approach as design material, limiting creative processes like *reflection-in-action*,[6] where ideation unfolds through direct engagement with the material.

Chunk 7 However, these hands-on processes facilitate the development of new and innovative applications and encourage critical thinking. This requires a tacit understanding of the material.[7] We therefore consider hands-on engagement and a learning-through-making mindset as key to grasping AI's functional principles and enabling creative exploration.

At HfG Schwäbisch Gmünd, one area of focus is Physical AI—machine learning on microcontrollers that interact with their environment through sensors and actuators.[8] Due to the limited computing power of this hardware, the models are small, making their functionality easier to grasp.

Chunk 8 The hardware's low cost increases accessibility. Physical AI thus provides a practical entry point to machine learning. Sensor-based data allows for fast training cycles and immediate feedback, supporting iterative, real-world experimentation.

4: Sewing, F., & Flechtner, R. (2024). *Demonstrating SandwichNet –A Playful Tool for Teaching the Basics of Neural Networks*. <https://doi.org/10.18420/MUC2024-MCI-DEMO-322>

5: Sewing, F., & Stankowski, A. (2024). SandwichNet. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/sandwich-net/>

6: Schön, D. A. (1984). *The reflective practitioner: How professionals think in action*. Basic books.

7: Yang, Q., Banovic, N., & Zimmerman, J. (2018). Mapping Machine Learning Advances from HCI Research to Reveal Starting Places for Design Innovation. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–11. <https://doi.org/10.1145/3173574.3173704>

8: Flechtner, R., Kilian, J., & Iovine, I. (n.d.). Sensor-Based AI in Art and Design. In *Un/learn ai : Navigating AI in aesthetic practices* (Vol. 2). <https://doi.org/10.25358/openscience-11830>

We use Edge Impulse,[9] an online platform that simplifies data collection, labeling, model building, and training. Students are introduced to the process through a sample project using the Arduino Nano 33 BLE Sense microcontroller,[10] training a model to distinguish movement gestures. This hands-on approach enables them to carry out the entire data collection and training process, even within short teaching formats.

Chunk 9 To reinforce the relevance of the technology in design and support the exploration of novel forms of human-machine interaction, we then set specific thematic tasks. For example, in one workshop, students explored creative and unconventional ways of engaging with devices and simple games.[11] Results included a pressure-gesture-controlled lamp using barometer data or a sound-based snake game controller (Figure 3).

Chunk 10

Figure 3: A sound-based snake game controller by Ron Eros Mandic and Lukas Speidel.

II. p. 205, Chunk 9: Shaping Human-AI Relationships
II. p. 149, Chunk 4: Making (Non)Sense
II. p. 191, Chunk 35: SandwichNet

Chunk 11 Two major challenges in hands-on exploration with sensor-based AI in teaching are students' limited coding experience and the technical demands of physical prototyping.

Chunk 12 To address this, we created reusable code elements and technical setups.

II. p. 211, Chunk 10: Uncanny Type
I. p. 86, Chunk 3: Robotik und Computer Vision…

Chunk 13 The *code elements*[12] are structured for easy adaptation and offer sensing and acting possibilities for interactive AI-based systems. This provides a boilerplate to students, who can turn their concepts into interactive prototypes. The input options include motion, sound, barometer, camera, and thermal camera sensors; output options include onboard RGB LEDs, radio sockets, and keyboard emulation. Radio sockets

9: AI for Any Edge Device. (n.d.). In *Edge Impulse*. <https://edgeimpulse.com/>

10: Nano 33 BLE Sense. (n.d.). In *Arduino Docs*. <https://docs.arduino.cc/hardware/nano-33-ble-sense/>

11: Flechtner, R. (2023). Controller: Lab Week Workshop 2023. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/lab-week-23-controller/>

12: Flechtner, R., Sewing, F., & Tost, J. (2025). Code Elements Input Output. In *GitLab - KITeGG*. <https://gitlab.rlp.net/kitegg/public/hfgsg/code-elements-input-output/>

allow control of any device connected to a 240V outlet. The keyboard emulation can trigger any computer function that can be activated by a single keystroke and serves as a bridge to p5.js and ml5.js projects. Sample code supports interaction with LLMs and text or speech output.

The technical setup of interactive systems involving sensors and actuators also poses a challenge in teaching.

Chunk 14 Therefore, we developed *ready-made sensing and acting modules* together with colleagues at the Köln International School of Design (KISD).[13] [14] These predesigned and preprogrammed modules integrate sensors and actuators, enabling a quick start for training and prototyping. Communication between input and output modules occurs via an analog LED interface, which visualizes the system status and simplifies debugging. Sensor modules include motion, sound, piezo, distance, and light sensors; actuator modules feature servo motors, stepper motors, and radio sockets.

Another relevant topic in our teaching is the field of generative AI.

Chunk 15 The HfG Schwäbisch Gmünd has been involved in initiatives to *make generative AI tools and state-of-the-art models available to students*. Among others, the university is part of the bwGPT[15] initiative, which enables students to freely access powerful language models with their university account. Additionally, we host an image generation service based on Stable Diffusion at our lab and offer an experimental interface, an API, and a Slack bot to make image generation easy and accessible.

Chunk 16 In addition to the provision of services, *we developed custom-made tools* that enable students to enter into a deep, hands-on engagement with the technology as material. The *Prompt Diary* (Figure 4) enables an iterative and explorative approach to prompting images. Students can iteratively adapt prompts, create variations, and visually document the process. Using a sticky-note metaphor, prompts can be expanded and combined. The output appears as image tiles and can be reused as a starting point or as a ControlNet embedding.

13: Flechtner, R., & Kilian, J. (2024). Making (Non-)Sense—A Playful and Explorative Approach to Teaching AI Intuition for the Design of Sensor-Based Interactions. *Proceedings of the 6th Annual Symposium on HCI Education*, 1–9. <https://doi.org/10.1145/3658619.3658643>

14: Kilian, J., & Flechtner, R. (2024). Making NonSense. In *GitLab - KITeGG*. <https://gitlab.rlp.net/kitegg/public/making-nonsense/>

15: *bwGPT*. (n.d.). <https://www.zml.kit.edu/bwgpt.php>

Chunk 17

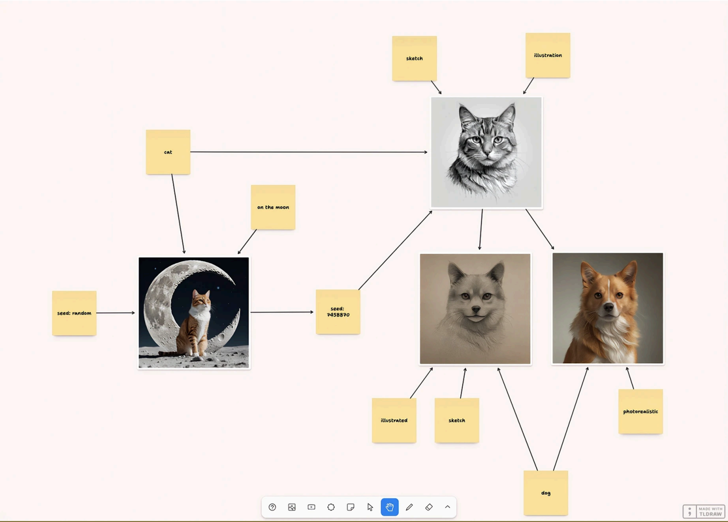


Figure 4: Prompt Diary, a simple canvas-based tool for image generation with Stable Diffusion.

Another tool, *Transferscope*,[16] explores the capabilities of image generation models in combination with ControlNets—models that enable more precise control over generated content, such as through edge or line detection. Transferscope is both a physical device made with a Raspberry Pi and 3D-printed parts (Figure 5, left) and a web platform for students to engage with in our courses. With a one-button interface, users can capture the style of an object or concept and transfer it into another object or scene (Figure 5, right), encouraging playful, creative engagement with generative AI.[17]

Chunk 18

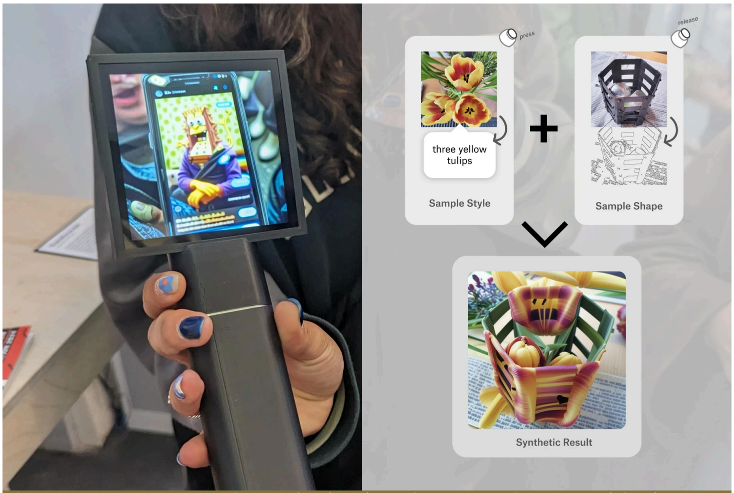


Figure 5: Transferscope. Physical device (left) and image generation process (right). Project by Christopher Pietsch.

II. p. 180, Chunk 7: Editorial
III. p. 3, Chunk 2: Editor`s Note
II. p. 34, Chunk 13: Trier

Chunk 19

Enabling Conceptual Engagement

Developing interesting and meaningful AI applications poses a challenge for designers.

16: Pietsch, C. (2024). Transferscope – Synthesized Reality: Sample anything. Transform everything. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/transferscope/>

17: Pietsch, C., & Stankowski, A. (2024). *Transferscope – Making Multi-Modal Conditioning for Image Diffusion Models Tangible*. <https://doi.org/10.18420/MUC2024-MCI-DEMO-248>

[18] To support ideation, we created methods and courses that foster creative friction and encourage conceptual engagement with AI in playful, unconventional ways.

One approach involves imagination cards,[19] inspired by creativity theories and artistic movements like Fluxus or Oulipo. These digital card decks, tailored to different course topics, constrain and provoke unusual idea generation. In a workshop, cards are randomly assigned to students to create concepts based on the given variables. While a particular card combination narrows the possibilities to one specific setting and ensures focus, unconventional combinations encourage creative thinking and exploration of unusual concepts. One example is the *Input/Output* imagination cards, which provide a combination of an input technology (e.g., a sensor) and an output medium for students to consider technical deployment while drafting potential ideas (see Figure 6 for an example project inspired by the cards).

Figure 6: A concept created with the Input/Output imagination cards: Gloomy, a lamp which, based on facial expressions (input), provides visual and auditory feedback (output), by Rebeka Tot and Vivien Cai.

I. p. 195, Chunk 4: Unpacking the Language of…
I. p. 189, Chunk 3: Exploring Tools
I. p. 197, Chunk 9: Unpacking the Language of…

Chunk 20

Another category uses metaphors as a design resource for developing AI interactions.

I. p. 195, Chunk 4: Unpacking the Language of…
I. p. 197, Chunk 8: Unpacking the Language of…
I. p. 195, Chunk 1: Unpacking the Language of…

Chunk 21

Metaphors are a potential means for both understanding the complex entanglements of AI as well as for exploring new ways of interacting with intelligent products.[20] [21] This supports *otherness*, that is, the design of novel roles, affordances, or interaction paradigms beyond conventional anthropomorphism and zoomorphism.

18: Dove, G., Halskov, K., Forlizzi, J., & Zimmerman, J. (2017). UX Design Innovation: Challenges for Working with Machine Learning as a Design Material. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 278–288. <https://doi.org/10.1145/3025453.3025739>

19: Imagination Cards. (n.d.). In *AI+Design Lab HfG Schwäbisch Gmünd*. <https://imagination-cards.aid-lab.hfg-gmuend.de/>

20: Murray-Rust, D., Lupetti, M. L., & Nicenboim, I. (2024). *Metaphor Gardening: Experiential engagements for designing AI interactions*. <https://doi.org/10.21606/drs.2024.376>

21: Tost, J., Flechtner, R., Maué, R., & Heidmann, F. (2024). Caring for a companion as a form of self-care. Exploring the design space for irritating companion technologies for mental health. *Nordic Conference on Human-Computer Interaction*, 1–15. <https://doi.org/10.1145/3679318.3685343>

[22] In the Caring for Machines workshop,[23] students reimagined interactions with AI beyond the *technology as servant* metaphor, exploring how caring for a technology can inspire more responsive and reciprocal interactions (see Figure 7 for an example project).

Figure 7: Social Spark detects awkward silences in conversations and fills them with random facts or jokes. Project by Philipp Maginot and Sebastian Weinert.

Chunk 22 A third approach uses *experimental and performative methods*, such as role-play, improvisation, and object-centered perspectives, to explore the nuances of human-AI relationships.[24] Methods such as *thing ethnography*,[25] [26] *techno-mimesis*,[27] and *object persona*[28] (Figure 8) encourage students to adopt the perspective of technological systems, revealing unique affordances and inspiring new design ideas. Performative methods such as role-play and improvisation facilitate conceptual exploration of human-AI interactions—without ignoring the technical complexity nor requiring in-depth technical knowledge (Figure 9).

22: Hassenzahl, M., Borchers, J., Boll, S., Pütten, A. R. der, & Wulf, V. (2021). Otherware: How to best interact with autonomous systems. *Interactions*, *28*(1), 54–57. <https://doi.org/10.1145/3436942>

23: Flechtner, R., Sewing, F., & Tost, J. (2025). Caring for Machines. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/caring-for-machines/>

24: Flechtner, R. (2024). Shaping Human-AI Relationships – Workshop. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/shaping-human-ai-relationships/>

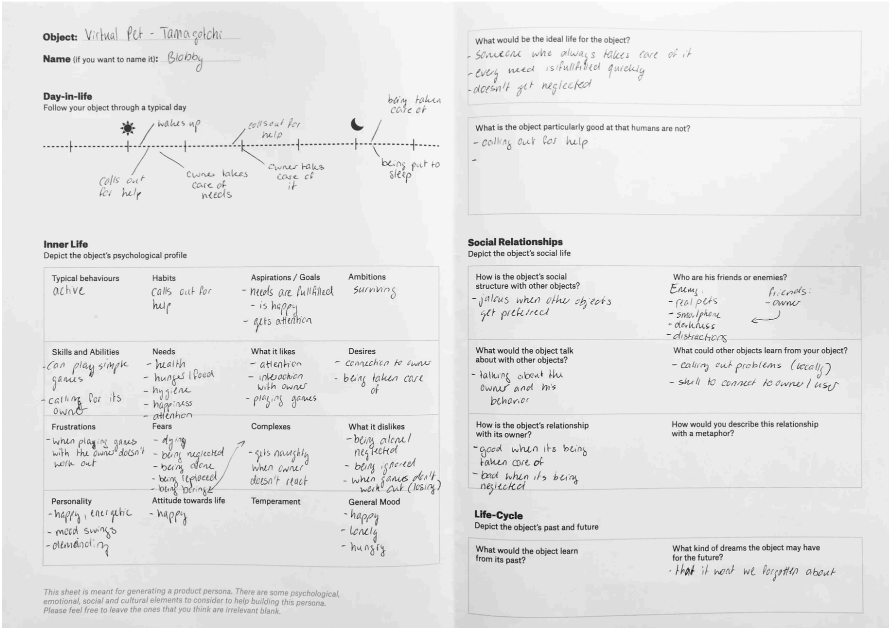
25: Giaccardi, E., Cila, N., Speed, C., & Caldwell, M. (2016). Thing Ethnography: Doing Design Research with Non-Humans. *Proceedings of the 2016 ACM Conference on Designing Interactive Systems*, 377–387. <https://doi.org/10.1145/2901790.2901905>

26: Nicenboim, I., Giaccardi, E., & Kuijer, L. (2018). Designing Connected Resources for Older People. *Proceedings of the 2018 Designing Interactive Systems Conference*, 413–425. <https://doi.org/10.1145/3196709.3196808>

27: Dörrenbächer, J., Löffler, D., & Hassenzahl, M. (2020). Becoming a Robot - Overcoming Anthropomorphism with Techno-Mimesis. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–12. <https://doi.org/10.1145/3313831.3376507>

28: Cila, N., Giaccardi, E., & Tynan-O`Mahony, F. (2015). Thing-Centered Narratives: A study of object personas. *Proceedings of the 3rd Seminar International Research Network for Design Anthropology, Online proceedings*, pp. 1–17.

Chunk 23



Object: Virtual Pet - Tamagotchi

Name (if you want to name it): Blobby

Day-in-life
Follow your object through a typical day

wakes up
calls out for help
being taken care of
calls out for help
owner takes care of needs
owner takes care of it
being put to sleep

Inner Life
Depict the object's psychological profile

Typical behaviours active	Habits calls out for help	Aspirations / Goals - needs are fullfilled - is happy - gets attention	Ambitions surviving
Skills and Abilities - can play simple games - calling for its owner	Needs - health - hunger / food - hygiene - happiness - attention	What it likes - attention - interaction with owner - playing games	Desires - connection to owner - being taken care of
Frustrations - when playing games with the owner doesn't work out	Fears - dying - being neglected - being alone - being replaced - being boring	Complexes - gets naughty when owner doesn't react	What it dislikes - being alone / neglected - being ignored - when games don't work out (losing)
Personality - happy, energetic - mood swings - demanding	Attitude towards life - happy	Temperament	General Mood - happy - lonely - hungry

This sheet is meant for generating a product persona. There are some psychological, emotional, social and cultural elements to consider to help building this persona. Please feel free to leave the ones that you think are irrelevant blank.

What would be the ideal life for the object?
- someone who always takes care of it
- every need is fullfilled quickly
- doesn't get neglected

What is the object particularly good at that humans are not?
- calling out for help
-

Social Relationships
Depict the object's social life

How is the object's social structure with other objects? - jalous when other objects get preferred	Who are his friends or enemies? Enemy: - real pets - smartphone - darkness - distractions Friends: - owner
What would the object talk about with other objects? - talking about the owner and his behavior	What could other objects learn from your object? - calling out problems (vocally) - skill to connect to owner / user
How is the object's relationship with its owner? - good when its being taken care of - bad when its being neglected	How would you describe this relationship with a metaphor?

Life-Cycle
Depict the object's past and future

What would the object learn from its past?	What kind of dreams the object may have for the future? - that it wont we forgotten about

Figure 8: Object persona sheet (inspired by Cila et al. 2015) of a Tamagotchi as a virtual pet.

Chunk 24

Figure 9: Students role-playing a fitness tracker.

Chunk 25 The fourth approach uses *generative AI as a co-designer and counterpart for ideation*. We have developed tools and processes that playfully support imagination through the co-creation of speculative scenarios and fictional design objects, in collaboration with image generators and LLMs. To explore co-creation and collaborative future-making with generative AI, we developed the course *Futures Lenses: Co-speculating Things with AI*.[29] We used a hands-on approach combining critical design strategies—like anti-solutionism, irony, and absurdity—with simple no-code AI tools such as *Transferscope* and the *Futures Lens*. By deliberately applying constraints, ambiguity, or exaggeration with a prompt, the *Futures Lens* course was

29: Tost, J. (2024). Futures Lenses. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/futures-lenses/>

meant to provoke errors and unexpected results in the output images. These *accidents* became a source of critical and creative thinking by helping students defamiliarize everyday objects, expose paradoxes and biases, and get inspiration for new design ideas through iterative exploration (see Figure 10 for an example project).

Figure 10: Calm Futures. A speculative concept (left) and a catalog of fictional things (right), created collaboratively by Anja Gutmann, Lea Haferbier, Carolin Kaltwasser, and the Futures Lens. The concept shows a lamp for promoting well-being through symbiotic, reciprocal interactions.

Chunk 26

Encouraging Critical Reflection

A significant part of the critical examination of AI technologies and their societal, ethical, and ecological implications occurred through theoretical input and discussion. For instance, various courses addressed the intentional or unintentional shaping of human-machine relationships through design, discussing the benefits and risks of employing anthropomorphic or zoomorphic approaches. While such designs may foster trust and connectedness, they also risk creating false expectations or overreliance on AI systems.

In other formats, hands-on engagement with the technology was used to initiate critical discussion and reflection on emerging phenomena. Topics included biases in the data sets of generative models, computational and environmental costs of AI, the evolving role of designers in light of increased automation of design processes, and the responsibility of designers in shaping these processes and tools.

To further promote critical thinking, we developed specific methods. One example is *Fake or Real* (see Figure 11), a teaching activity developed by Lisa Kern in collaboration with the AI+Design Lab. Students were presented with real and fake facts and used them to generate texts and images for convincing social media posts. Afterwards, they were challenged to identify the fake posts. The method served to reflect on how easily fake news can be produced, what indicators may suggest inauthenticity, and how the authenticity of information can be verified.

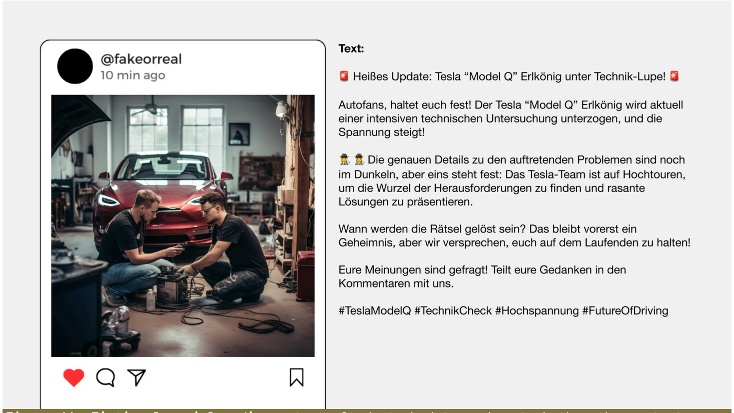


Figure 11: Fictional social media content. Students had to work out whether the content was fake or real.

Chunk 27 One tool that we developed specifically for critically engaging with machine learning models and datasets is the *unStable Mirror* project (see Figure 12). The mixed-media installation highlights the potential of generative AI, while also addressing its limitations and inherent biases.[30]

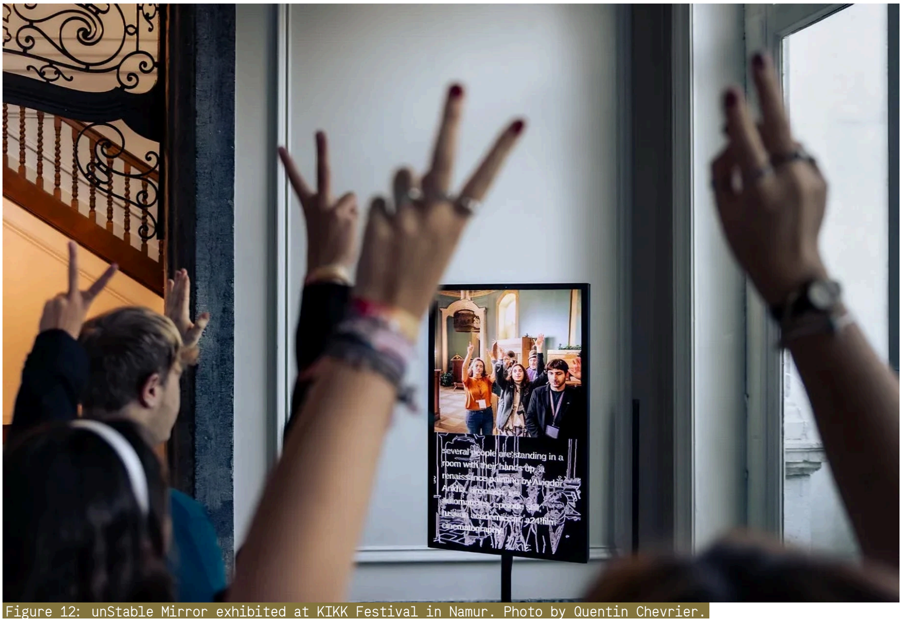


Figure 12: unStable Mirror exhibited at KIKK Festival in Namur. Photo by Quentin Chevrier.

Chunk 28 Moreover, exploring possible technological futures with AI is a potential strategy for supporting critical reflection on common, widespread AI narratives.[31] [32] Embracing this notion, the *Futures Lenses* course, besides exploring and co-ideating novel design concepts, also aimed at exposing stereotypical future visions embedded in generative AI systems. Recognizing and questioning these mainstream future visions is key skill as generative AI becomes more prevalent in design education and industry for ideation.

30: Pietsch, C. (2023). unStable Mirror: A Journey into the Heart of AI Generativity and Bias. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/unstable-mirror>

31: Tost, J., Gohsen, M., Schulte, B., Thomet, F., Kuhn, M., Kiesel, J., Stein, B., & Hornecker, E. (2024). Futuring Machines: An Interactive Framework for Participative Futuring Through Human-AI Collaborative Speculative Fiction Writing. *ACM Conversational User Interfaces 2024*, 1–7. <https://doi.org/10.1145/3640794.3665904>

32: Ghajargar, M. (2024). AI and Future-Making: Design, Biases, and Human-Plant Interactions. *Proceedings of the 27th International Academic Mindtrek Conference*, 24–35. <https://doi.org/10.1145/3681716.3681738>

Insights from Three Years of Teaching at the AI+Design Lab

Over the past three years, we tested a variety of teaching formats—from compact workshops to extended project courses—grounded in our four educational pillars. Each format varied in its emphasis.

Chunk 29 Some focused on technical literacy, deepening it through hands-on engagement with the technology (e.g., *Controller*[33] or *Making(Non-)Sense*[34]). Others focused on conceptual engagement, either introducing it through hands-on engagement with the technology (e.g., *Futures Lenses. Co-speculating Things with AI*,[35] or *Caring for Machines*[36]) or starting from conceptual engagement and then moving on to critical reflection (e.g., *Shaping Human-AI Relationships*[37]). A foundational course attempted to address all four areas, though not all were covered in equal depth.

II. p. 206, Chunk 11: Shaping Human-AI Relationships
III. p. 10, Chunk 5: Introduction
II. p. 202, Chunk 5: Editorial: Show and Tell

Chunk 30 *Providing technical and conceptual depth requires sequential formats*. Balancing technical literacy and conceptual engagement proved challenging within time-limited formats. Students in technical courses sought conceptual application, while those in concept-driven formats wanted deeper technical knowledge. Experimental approaches, such as role-play, offered accessible entry points to the technical foundations, but the abstraction sometimes limited comprehension and translation into realistic design concepts. Tools like ideation cards and input-output cards helped guide ideation, yet students often struggled to move beyond simplistic or unrealistic concepts. These insights point to the need for consecutive formats—starting with foundational technical knowledge deepened through hands-on engagement, followed by advanced conceptual exploration and critical reflection.

Different stages of the creative process require different types of AI tools. Early, exploratory phases benefit from simple, no-code interfaces—they're easy to use, encourage experimentation, and often lead to surprising results that spark new ideas and enable critical thinking. Taking image generation with Stable Diffusion as an example, useful no-code tools include simple custom interfaces for text-to-image generation, the *Prompt Diary* canvas-based tool, or tools such as *Transferscope* or the *Futures Lens*. Using simple tools in early stages also fosters curiosity about the technology, helping students identify what they need and want to learn.

Chunk 31 As projects progress, more complex tools (e.g., ComfyUI) allow for greater control and precision. These tools help students refine details and customize outcomes.

Co-creating and co-speculating with generative AI beyond the perfect prompt: openness and a new perspective towards AI are required. The

33: Flechtner, R. (2023). Controller: Lab Week Workshop 2023. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/lab-week-23-controller/>

34: Kilian, J., & Flechtner, R. (2024). Making NonSense. In *GitLab - KITeGG*. <https://gitlab.rlp.net/kitegg/public/making-nonsense/>

35: Tost, J. (2024). Futures Lenses. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/futures-lenses/>

36: Flechtner, R., Sewing, F., & Tost, J. (2025). Caring for Machines. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/caring-for-machines/>

37: Flechtner, R. (2024). Shaping Human-AI Relationships – Workshop. In *AI+Design Lab*. <https://aid-lab.hfg-gmuend.de/articles/shaping-human-ai-relationships/>

increasing use of mainstream AI tools (e.g., ChatGPT, Midjourney) has established the expectation that designing with AI depends on writing the *perfect prompt.* This turns the creative process into a rational sequence of instructions and clashes with the non-linear, exploratory nature of design processes. Teaching AI intuition requires shifting this mindset: students must learn to embrace generative AI as a co-creator—an agent of surprise and creative friction that can enrich the design process. In *Futures Lenses*, students were initially frustrated by the lack of control over generated outcomes. However, as the process unfolded, many students began to understand the creative potential in these unexpected results. One student noted, "We were frustrated by the mistakes, but these mistakes brought out the best ideas of our project." We conclude that collaborating with AI in co-creation and co-speculation involves learning to let go of control and accepting that the results will not always match the original idea. Instead of seeing this as a technical limitation, students should learn to view it as a chance to enrich the creative process, uncover new perspectives, and open up new directions. Teaching students this shift in mindset can help them move past preconceived expectations and engage more fully with the potential of AI as a creative counterpart.

AI-generated concepts provide a surface for critically reflecting on mainstream AI metaphors and future narratives related to AI, as well as roles that we stereotypically assign *by default* to intelligent products and agents. These stereotypical narratives or roles, which are spread by industry commercials or pop culture media, such as films or literature, are strongly embedded in our collective imaginaries.

Chunk 32 Acknowledging this fact and critically reflecting on these visions is part of enabling a critical mindset. While students often replicate such stereotypes in their preliminary ideas and concepts, seeing them echoed in AI-generated outputs enables a critical distance.

Experimental methods hold potential for teaching AI in design. Experimental methods, such as the object-centered approaches, facilitated a change of perspective that enabled students to break away from solution-oriented approaches. This encouraged in-depth discussion of the ethical and moral dimensions of AI systems and underscored the designer's responsibility in shaping these technologies.

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