



Text as a Tool. The Effects of Using Image-Generating AI in German University Contexts

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Abstract: This article investigates how German university students learn to use image-generating artificial intelligence and its implications for educational practice. Using semi-structured interviews and think-aloud protocols, twelve students (aged 18-26) from media and social science programs at three German universities created personal and academic images using Midjourney. Through descriptive thematic analysis, findings reveal that image-generating AI creates initial excitement and motivation while fostering soft skills including persistence, precise communication, and openness to new experiences. However, some students experienced frustration when attempting to realize specific visual concepts and showed susceptibility to distraction. Notably, students with broader general knowledge in art history and technical terminology achieved more successful outcomes. Further, the study identifies a fundamental shift in university learning paradigms: whereas academic work traditionally progresses from images to textual analysis, image-generating AI reverses this process, positioning text as a tool for visual creation. This has implications for curriculum designs, suggesting the need for enhanced visual literacy, expanded general education requirements, and explicit instruction in AI bias recognition. For educational practice, image-generating AI can serve as a valuable pedagogical tool for increasing engagement while requiring careful scaffolding to prevent distraction and ensure critical evaluation of outputs. The study contributes foundational insights for developing pedagogical frameworks that harness the potential of image-generating technologies in education.

Keywords: artificial intelligence, image generation, qualitative research, German higher education, digital technologies, visual literacy, general knowledge

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Introduction

Learning and researching with artificial intelligence (AI) are topics that are currently being hotly debated at universities, schools, and other institutions worldwide. This article would like to contribute to the debate, but unlike most (Baidoo-Anu & Owusu Ansah 2023, Meyer et al. 2023), focuses on image-generating AI and the way students appropriate the technique for their personal and university work. Further, it analyses the implications of this appropriation.

In 2023, Zhai published a paper on AI that has been mostly written by AI – which may not have been obvious if he had not clearly stated it. The same applies to pictures. The output of image-generating AI may look like paintings or drawings, and also already comes very close to photographic images, causing confusion, fascination, but along with it the necessity to discuss how to deal with this technology in the future. It could be seen as even more important, as pictures have a strong influence on our emotions. Further, seeing is, even after all the doubts created by picture manipulation starting basically with the invention of photography itself, equalled to believing (Cohen & Meskin 2010: 70), which may lead to image-generating AI being an even more touchy subject – be it with regard to rather documentary or artistically motivated topics (Guadamuz 2023, Sato 2023, Roza 2019).

1. Prompting

Image-generating AI works with prompts which are usually written instructions for the AI, describing what should be seen in the picture. In this article, we refer to diffusion models. This is a technology able to interpret natural language instructions or “prompts” and generate images from this interpretation. These models are made possible by the availability of large image corpora such as ImageNet (Deng et al. 2009) and LAION-2B (Schumann et al. 2022), which contain image pairs and associated human annotations, the advancement of natural language models such as Transformers and the GPT-2 architecture (Radford et al. 2019), which are able to represent real-world concepts in a mathematical vector space, and by using neural latent diffusion models that continuously refine images depending on the input text (Rombach et al. 2022). Starting from pure noise, a diffusion model iteratively refines its input according to patterns learned from the training data and the prompt text until it reaches a final image after a series of steps. It is also possible to start from an existing image and use this as a prompt, possibly with further text specifications. If the original image is still recognizable at the end, the result is referred to as a style transfer (Gatys et al. 2016).

Even though it is possible to create attractive and complex works with very simple prompts, writing good prompts has now even become a professional field that may be interesting for students of media science, social sciences, art etc. but also in the field of scientific illustrations. However, this article is not about particularly complex prompts, but about how people approach prompting from the very beginning.

2. The Sample, the Set-Up, and Perspective

To find out more about this topic, twelve volunteers, university students between the ages of 18 and 26, were selected, eight women and four men from three different institutions in Germany. All gave their informed consent to the study, allowing me to quote their statements. Apart from this, anonymity was granted.

The students had a middle- or upper-middle-class background and shared, as they were studying subjects connected to society and/or media, a general interest in the field. In addition, all of them have intensively used digital media at university and in their leisure time, e.g. dealt with photography, filmmaking, web design, or computer games, but not yet with image-generating AI. All of them had already tried ChatGPT for text generation in their private or students’ lives.

Before letting them use the AI, the subjects were briefly interviewed for demographic data and about their attitudes towards image-generating AI, asking questions like “are you interested in the current developments regarding AI?,” “for which purpose did you use AI so far?,” “in general, do you think AI has a positive or negative impact on humanity?,” “which aspects of AI do you see positively, which negatively?” After the semi-structured interviews, the responses to which were transcribed during the process, the students were introduced to the prompting process on

Midjourney. Then, they were asked to come up with a) a picture they would put on their wall in their home and b) a picture that would illustrate a topic they work on in their university courses. Thus, they would first try to create a picture that reflects their personal interests and aesthetics, and then create a more professional picture, both covering various ways how image-generating AI can be used. They were also asked to articulate how they felt about the AI-process using the think-aloud-method. This often resulted in a small dialog where I was asked what I thought of the results or if I could help improve the results. Although I held back, I provided support where necessary, which could be seen as an external influence, just as my presence itself.

The students' statements were then sorted into categories following an ethnographic content analysis. To ensure that these categories were not only seen by me, a specialist in computational linguistics was asked to review the transcriptions and sort the answers, which led to an almost identical result, thus to categories that covered the same content. Together, we then discussed the naming of the categories and decided on their titles.

In the present context, the constructivist and cultural anthropological perspective on learning, in which knowledge is related to questions of active construction of meaning, seems a suitable way to approach the topic. The formation of knowledge depends on the personal learning biography but is also embedded in cultural contexts (Reinmann 2015: 140). Here, it is important that both in the specific subject areas of the students, but also in the culture, there is a stress on creativity: so-called "Western cultures tend to endorse creativity – supporting values or practice" (Kwan et al. 2018).

Of course, the study has some limitations to it: the sample is rather small and homogenous, yet it may represent an avantgarde and could be prototypical of later generations of students. However, the situations of students from a lower-class, less privileged background will probably have to be analysed separately, as the digital divide probably plays an important role in the context. Then, since I, the author and interviewer, was obviously interested in AI and some students probably knew that I had already published on this topic, it is conceivable that an interviewer effect may have occurred, i.e., that the students for example rated their interest in or experience with AI higher. However, the subjects taught at their institutions would encourage students to adopt a reflective attitude, so my presence may not have influenced their answers in such a way that they were overly positive. Again, the results could be different with students who study subjects that do not foster a differentiated perspective on the socio-cultural environment, but rather focus on technical aspects, for example. Furthermore, there was no long familiarisation phase for the students with the AI and as it is not a longitudinal study, it is hard to say how things would develop if students continued using the AI.

3. Experiences with AI

It turned out that all subjects were interested in AI, some were quite cautious about it, others were somewhat to very open-minded. Their major concerns were that AI, also image-generating AI could cost jobs and that the possibility for deep fakes would make it harder to trust in media information.

In the following, we will look at how the participants described their experiences with image-generating AI via the method of thinking aloud. The categories are derived from an ethnographic content analysis.

3.1. Excitement and Fun

All participants, even those who had previously been sceptical, quickly took over after the introduction and started to generate images on their own. All were initially enthusiastic about how a selection of images emerges out of nowhere after entering the prompt. Several emotions were mentioned in this context: the feeling of magic, surprise, and flow, obvious in quotes like "it is really fun, I am so excited about the outcome that is slowly building up right now" or "I feel excited and relaxed at the same time, I am in the flow right now". Thus, the image generation is similar to instant photography: "You can compare the image with the development process, a small film is playing in front of your own eyes in which the image slowly takes shape. Its emergence out of nothing, out of whiteness, has almost metaphysical traits" (Jerrentrup 2020: 22).

The feeling of "flow" has been mentioned or paraphrased several times by those interviewed so far. The term, coined by Mihály Csíkszentmihályi (see 1996/2010), refers to a specific type of intrinsic motivation for activities (see Fischer &

Wiswede 2009: 100) in which one is neither underchallenged nor overwhelmed, in which one can “get absorbed” and it may be one of the major strong sides of image generating AI – that it gets people in this positively-experienced state. Anticipation also plays an important role in this – “I am so excited if I get what I envisioned” –, but at the same time the inability to predict the results accurately, in fact, one can even use prompts for which one has no visual idea oneself – “let’s see if such a crazy combination leads to anything at all”. The resulting images are therefore nearly always more or less surprising – at least for those who are new to working with image-generating AI. Yet, this may change somewhat over time when one notices that very similar results often emerge that are related to the well-known biases.

3.2. Recognition of Biases

After several prompts, more than half of the participants tested if the software was biased, using prompts like “beautiful woman”, “beauty”, or “intelligent person” up to “myself” to see how the software would imagine the underlying concepts. Even without any guidance, the students were aware of eventual biases, which they also articulated. The biases were linked to social biases that persist: “Pretty women all look the same or what?”, “So typical old white guys, why does it [the software] think I am one of them?” (a female student prompting “I” resulting in an image selection of mostly white men), “it is all very white” (a white female student after looking at her results with a prompt that used “woman” but did not specify the appearance). However, taken the specific nature of the sample, it is not clear if students typically would have detected such biases by themselves. Further, there are some biases they hardly noticed, e.g. the preference of the medium of photography over other forms of visual representation (mentioned by only one student), with typical image structures perceived as harmonious or artistic (regulated by the parameter “Stylize”, mentioned by none).

Biases, e.g. the aforementioned racial biases or the preference of the so-called Western cultural context (Sterne 2000: 191, Turk 2023) have a long history in visual media: for a long time, films for analogue cameras were not good at representing dark skin tones, instead using “Shirley cards” with a Caucasian model as reference, and until today, face detection does not work as well with dark skin tones as with light tones (AIM Media House 2024). Even though, looking at their technical foundations, it is not surprising that image-generating AI continues such biases, it is important to recognize and circumvent them with appropriate prompts. By blindly accepting AI-generated images, biases would be replicated over and over again. However, it can be noticed that newer software versions, e.g. of Midjourney, map the biases somewhat lower, but they still exist.

3.3. Communication Training

If the initial enthusiasm gave way to the desire to present concrete things, most participants quickly reached their limits. All of them said that, to a significant extent, the images could not be implemented according to the idea. This was especially true for the images that were to be shown in a more professional context. Consequently, different strategies were used: some participants tried new formulations over and over again, others relied more on many iterations until an image came closer to the idea, sometimes stating “it [the AI] doesn’t understand me”, “we both [the AI and I] have issues” (smilingly).

The prompts were usually written according to the trial-and-error principle. Some participants suspected that this can promote endurance: “One prompts until something satisfying is created”, “I will just go on until I like it and work on my patience”. In fact, studies have shown that perseverance can be an important communicative skill and condition for creative work (Lucas & Nordgren 2015). Thus, it may not only be promising to teach prompting for success in fields related to image-generating AI, but also for more general soft skills such as learning to reframe ideas, present them differently to different audiences, and practice patience.

Related to this context, it is important to also consider students with special needs. It has been shown that such students also benefit from many kinds of AI (Yang et al. 2024) and it may be particularly interesting for students with dyslexia.

3.4. Openness

Several participants deliberately stated their actual image goal and said that the image provided by the AI did not correspond to what they had imagined but was still interesting: “This is not what I wanted, but why not change my goal, this one is nice,” “okay, interesting, I will follow this path now”. Accordingly, the image goal was occasionally modified or abandoned in favour of a completely new direction, which could be characterized as a “chance of serendipitous discovery” (Byrne 2023: 2). This suggests that openness, one of the “Big Five” personality traits, is being trained here as an important prerequisite for creativity (McCrae & Greenberg 2014: 222) but also for encounters with other people and mutual understanding.

On the other hand, one can also assume that the image-generating AI with its visually interesting results leads to deviating from actual goals. The participants confirmed both assumptions when thinking aloud – some got very distracted and especially in the first exercise lost sight of their initial goal and ended up just playing around. This indicates that there is a potential of image-generating AI to distract people from their actual goals, eventually leading to a scattered and even addictive behaviour.

However, it should be mentioned that for the participants, it has been their first encounter with image-generating AI, thus, it may be the appeal of the new and the fun in experimenting that made some of them getting a bit lost. Furthermore, the tendency to diverge from the actual goal was more obvious in the first exercise, which also allowed for more variation. On the other hand, taken into account the experimental situation and social desirability, the effect may be even stronger under real-life circumstances.

3.5. Importance of General Knowledge

As students of media- and/or society-related subjects, the students had quite a broad general knowledge with respect to visual looks, current trends, historical epochs etc. Thus, after few trials that did not match the participants’ expectations, most specified the look not only by mentioning e.g. the desired colours but also giving more detailed information: art styles such as “art déco” or “bauhaus”, but also names of specific artists like “da Vinci” and “Yayoi Kusama” were used as prompts. When it came to technical aspects they e.g. wrote “open aperture”, “crossed processed look”, “WB 2700”, or “candy filter”. All concluded that a good general knowledge on aesthetics may lead to more appropriate pictures, stating e.g. “you can get a good result by chance, but it works faster and more reliably if you know what you are doing” or, more specifically “now I know why it wasn’t a waste of time to study design history.” Still, some instructions were not followed by the software, for example, instructions concerning the white balance did often not lead to the expected results. In some cases, the AI apparently could not put together concepts that felt too far apart, e.g. the attempt to develop a Bauhaus inspired sport via AI did not work out and just led to pictures of gyms in Bauhaus style. Yet, overall general knowledge proved to be very important to receive adequate images.

4. The Relationship between Words and Image

Working with AI image generation challenges the relationship between images and words. Despite the pictorial turn which gives more weight to images, learning, especially learning at university is still primarily associated with words. This was confirmed by the participants of the study, e.g. stating that “it is fun to finally work with pictures”. Visual mnemonics sometimes help, for example to link text elements with a visual map. Ultimately, however, it is words that are learned, remembered and used for analyses.

In the so-called Western cultural context, logos, understood not only as a science, but in its primary sense as a “word”, is usually seen as superior to the image: “Images only depict the world through passively receiving organs of perception, language, on the other hand, produces the world through actively formed concepts” (Geiger 2021: 24) or “‘sensual impressions’ as ultimately physically mediated stimuli are often subordinated to intellect-guided cognition” (Blank 2021: 96). Mitchell describes this as a distinction “between words and images [...], whereby the word is associated with law, literacy and elite rule, while the image is associated with popular superstition, ignorance and debauchery” (Mitchell 2009: 321).

At the same time, of course, it was noted that we live in an increasingly “visual age” (Bleiker 2018: 14) and “the relative importance of pictorial information is [even] steadily increasing” (Sarapik 2009: 277). In the meantime, images are being taken up more in many disciplines (e.g. Roeck 2003, Stolleis 2004, Heekeren 2021). However, the examination of the visual still takes place primarily in the medium of language and images are rarely allowed to speak for themselves. When pictures play a role, the order is usually: looking at a picture and then describing and analysing it with words.

With image-generating AI, the path is the other way around leading from words to images. Learning how to deal with words to evoke images plays a central role – so far quite similar to poetry, which is often used to create images in people’s heads. However, with image-generating artificial intelligence it is usually a much more technical approach. In this context, eloquence does not necessary means very elaborate and metaphoric language but a rather instructive use of language, especially if there are clear image goals. Precision on the one hand and empathy – trying to understand how the AI functions and eventually rephrase or deconstruct the original idea – on the other are central here.

In addition, the competence in dealing with image-generating AI also consists of a purely visual activity: judging and selecting images according to one’s goal, thus deciding on the ability of images to convey the desired messages respectively lead to the desired results. This includes aspects based on general visual studies, such as those outlined in *Gestalt* theory. However, in most cases, the socio-cultural background of the recipients plays a fundamental role, including something as simple as the reading direction from left to right or vice versa, which can be associated with different directional vectors, to more complex culture-specific habits and metaphors. Thus, capacities to assess images with regard to different presentations contexts, i.e. sociocultural groups, becomes a key qualification, a discipline that could be integrated into a *studium generale*.

Conclusion and Implications

Working with image-generating AI is a new learning experience that creates excitement and motivation, thus, is a good tool to integrate in classwork not only because it may be a key qualification in the future but also because it could facilitate learning. Further, it trains soft skills as it could provide a significant motivation for students to train differentiated and precise expressions, to formulate instructions clearly and/or to find work-arounds – abilities that may be useful in many occupational fields. It can also allow for the practice of patience, frustration tolerance, and openness to new experiences, thus, important soft skills. Unexpected results offered by the AI can lead students to discover new perspectives and thus broaden their horizon as well as practice their tolerance of dissonance, and even their interactive skills by learning to empathize and see things from different angles. However, “getting lost” in new, interesting perspectives could also distract them from their actual goal leaving them scattered, especially, if the exercises are quite open. Eventual addictive behaviours should be controlled in university environments; however, this aspect needs further research, especially longitudinal studies. Biases inherent in the software are often recognized by students familiar with social topics, however, it is important to point out to them and to teach how to circumvent them.

With regard to these biases, it becomes obvious that knowledge about social aspects plays an important role in image-generation with AI. In addition, a substantial level of general education is beneficial for the use of the software as appropriate descriptions are necessary for the prompts, as well as knowledge on the right look of something to select the right pictures. Further, knowledge on visual aspects and cultural contexts is key for successful image generation, i.e. conveying the intended meanings.

However, this knowledge does not have to be taught independently of image-generating AI. The connection between knowledge and good image results itself can create more motivation to accumulate more general knowledge. On the organizational level, this could lead to a reconsideration of curricula in a direction that promotes not only the continuously growing specialized knowledge but also stresses the study of general knowledge which can be combined with teaching image-generating AI. Some universities already offer optional or compulsory courses in “studium generale” which would be a good way to lead students to use image-generating AI as effective as possible.

The goal of image-generating AI is, unlike in most parts of university learning not referring to the use of words but to creating images. Thus, it resembles some artistic activities, but differs from others, as it works through language – language, however, is the tool, not the goal. This sets it apart from e.g. from the common use of ChatGPT in university contexts and this uncommon way alone may broaden the horizon and have the appeal of getting into something new

and innovative. It also seems like a second level visual turn that does not only acknowledge the importance of images but sees them as an ultimate goal – which makes it the more important to learn how to understand images. This, however, is not possible without regard to the sociocultural contexts and again emphasizes the importance of general studies.

In all this, the role of the author in the creation stays relatively vague (see Jerrentrup 2024: 818f.). Therefore, it may become a practice to publish prompts along with images so that the creative and conceptual potential of the pictures can be assessed. Still, this would create a weird way of setting AI-generated images apart from other (visually maybe very similar) images, as paintings or graphics often do not carry much more text than their title. Therefore, one of the most important aspects to be addressed in the future will be the question of authorship, credits, the relation between images created by respectively with the help of AI and other images, and ultimately a further exploration of the interplay between text and image.

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