

# German Design Educators' Post-Covid Challenges: Online, Artificial Intelligence (AI) and Government Data Restrictions

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## Abstract

This research examines the experiences of German design educators during the Covid-19 pandemic and explores how these experiences influenced design education's transition to the online studio two years afterwards. The research is based on surveys of 33 German design educators who represent 18 higher education institutions (University/University of Applied Sciences) during the pandemic and 32 surveys and six follow up interviews two years later. This is the first study that focuses exclusively on design education in Germany by presenting a before-and-after contextual snapshot. The results present both positive and negative experiences of educators from a wide range of design domains. The 'offshoring' of the studio to Internet-based communication and file sharing platforms during the pandemic has profoundly altered the perceptions and practices of design educators in Germany, where governmental hurdles, such as data restriction laws, are blocking the full integration of online technology in design education. The findings focusing on German design educator experiences are presented within the context of their international colleagues' experiences from a study conducted earlier. This research also touches on the influence of Artificial Intelligence (AI) on the future of design education as well as a general trend to go offline by encouraging a back-to-campus policy.

## Keywords

design studio pedagogy, online design education, blended design studio, Artificial Intelligence, technology-enhanced design studio, blended teaching

## Introduction

The closure of universities during the Covid-19 pandemic has led to a rapid turnaround in the employment of Internet-based file sharing and communication technology in an attempt to create online design studios. Design educators who did not routinely use these online platforms pre-pandemic had to learn to use them quickly to approximate face-to-face design classrooms (Jones & Lotz, 2021). Design educators produced a wide range of solutions to convert to teaching and learning design online in what is normally a face-to-face teaching studio pedagogy. It is the face-to-face aspect of studio-based design education that has been disrupted by the Covid-19 pandemic which forced the closure of physical design studios and prompted educators to flip their approach to online models (Fleischmann, 2020c, Jones & Lotz, 2021; Marshalsey & Sclater, 2020; Yorgancioğlu, 2020). The pandemic also digitally re-cast the design studio's experiential model and social dynamic where students share ideas and educators act as mentors in one-to-one and one-to-many physical spaces. Lehtonen et al., (2021) have characterised this online transition as "a sort of living lab".

Since the height of the pandemic, researchers have focused their inquiries on the strategies employed that helped make online studios in the higher education environment work and

detailed those student and educator experiences that presented challenges (e.g., Charters & Murphy, 2021; Fleischmann, 2020c, 2021, 2022; Jones, 2021; Hepburn & Borthwick, 2021). Although design domains varied, the literature supports the contention that online technology has an important role to play in the future of design education globally, not solely in western developed nations (e.g., Cho et al., 2022; Fleischmann, 2021; Izadpanah et al., 2022; Jones & Lotz, 2021). This paper focuses on where the German experience of incorporating online technology fits into how design is taught and learned in the contemporary design studio post pandemic. The experiences of German design educators have been absent in the debate on technology's incorporation in design education's future. The research presented addresses that gap.

This two-part study explores the initial transition of a group of German design educators from the comfort and familiarity of their physical studios to a virtual environment during the Covid-19 pandemic and investigates what changes were carried forward two years later. This study provides a unique first insight into how a group of German design educators adapted, how they are currently teaching design and how they see the future of design education in Germany unfolding—a perspective still missing from the academic discourse.

### **Design Education in Germany**

It was in Germany where the Bauhaus—the famous German art school—operated from 1919 to 1933 and which founded the basis for how design is taught and learned globally (White-Hancock, 2023). Currently, various design domains such as Communication Design, Fashion Design and Management, Product Design, Interface and User Experience Design, Interior Design can be studied at a University or University of Applied Sciences.

Prior to 1999, a German design degree would usually take four years and students graduated with a 'Diplom' in Design (not to be confused with the 'diploma' in English speaking countries which usually takes one to two years to complete) (Wikipedia, 2022). Since 1999, degrees changed through the Bologna Process with countries of the European Union and others agreeing to a united system of Bachelor and Master programs to allow flexible study, exchange options and comparison between degrees and countries (Wikipedia, 2023). As members of the European Union, German students do not have to pay fees to study at German Universities and Universities of Applied Sciences.

The selection process to get into German design programs is highly competitive. For example, "about 1300 students are allowed to enrol in a communication design degree program each year in German institutions but ten times more apply" (Popp, 2005; translated from German). Acceptance into the program is based on submitting a portfolio, a multi-day creative examination, interview, and completing home assignments (TarGroup Media GmbH, 2023).

The way design is taught and learned in Germany and elsewhere is called design studio pedagogy (Crowther, 2013; Schön, 1987; Shreeve, 2011; STP, 2009). The design studio was based on the 'atelier' method from the 'Ecole Des Beaux Arts' model (1819-1914) and was adapted by the influential German Bauhaus School (White-Hancock, 2023). The model builds on a master-apprenticeship relationship; the master (design educator) shares their knowledge and skills with the apprentice (student) and guides students in their creative development (e.g., Crowther, 2013; Fleischmann, 2016; Hart, Zamenopoulos & Garner, 2011; STP, 2009).

### **The Physical Design Studio Pedagogy**

Design education, whether it is face-to-face, blended, or online adheres to fundamental principles of an experiential model of learning (Kolb, 1984). Design students build, draw, conceptualise, discuss and interact socially in a physical studio that ideally embodies a sense of community and sharing and embraces informal as well as formal learning opportunities (Crowther, 2013; Danvers, 2003; Fleischmann, 2016; Shreeve, 2011; Hart et al., 2011). The practice-based design studio with its foundational characteristics of dialogical learning, the critique, and the studio as a place for learning and social interaction is considered a signature pedagogy (Shulman, 2005) of design education (Crowther, 2013; Shreeve, 2011). Design studio pedagogy differs from many other academic domains (e.g., business, sciences) in the way students learn and the way design educators teach.

The model of feedback–action–reflection (Schön, 1987) is a fundamental principle of the design studio pedagogy—it is a dialogical learning and teaching process. The design studio's dialogical learning process can be between educator and student—where the educator assumes the role as mentor who mediates the process of self-reflection—or among student peers (Danvers, 2003; Ellmers, 2006; Fleischmann, 2016; Shreeve, 2011).

Design work assessment is developed and presented through a critical review process, known as the critique or 'crit'. At its core, the critique is an organic process where students openly discuss what works and what does not about a particular design idea and process. In formal crits the educator gives individual feedback to the student in a structured way through presentations with all students participating (Blythman et al., 2007; Day, 2013; Fleischmann, 2016).

The community and social aspect of the design studio creates a culture that facilitates a sense of belonging which can motivate students to learn (Hart, et al., 2011; Wragg, 2020). Its informality is characterised by Corazzo and Gharib (2021, p. 147) as “ad-hoc opportunities for reflection-in-action” in a “low-pressure environment”. Researchers argue that these informal student encounters where ideas are exchanged play a central role in learning to design and supporting peer learning (Corazzo & Gharib, 2021; Fleischmann, 2016; McLain, 2022; Schrand & Eliason, 2012; Wragg, 2020). Ideally in studios, students are surrounded by notes, sketches and drawings, in a kind of design milieu (originally practiced in the Bauhaus) that emulates a professional design studio atmosphere and that encourages informal discussions.

### **The Online Studio Pre-Pandemic and its Application During Covid-19**

Long before Covid forced the transition of design classrooms into online platforms, design educators were experimenting with Internet technology that included the flipped classroom (e.g., Coyne et al., 2017; Fleischmann, 2020b; Yick et al., 2019) and fully online courses (e.g., Fleischmann, 2019; Jones et al., 2020; Watson et al., 2009). Social media for communication and critiquing (e.g., Schnabel & Ham, 2012; Güler, 2015; Fleischmann, 2014; Filimowicz & Tzankova, 2017) have been employed while the Virtual Design Studio (VDS) has been explored early on (e.g., Bradford, 1995; Kvan, 2001). Social interaction in online design studios has also been investigated (Lotz et al., 2015). Despite the experiments with technology-enhanced design classrooms, face-to-face teaching was still the dominant pedagogy preferred by design educators (Fleischmann, 2021).

It can be argued from recent published literature, that design educators from around the world have adapted well to the rapid changes during the Covid-19 pandemic (e.g., Ahmad et al., 2020; Fleischmann, 2020c; Marshalsey & Sclater, 2020; Yorgancioğlu, 2020; Jones & Lotz, 2021). However, the same researchers and others have also identified multiple challenges experienced by students and design educators. Those challenges—largely based on lack of social interaction—indicate that online design studios are neither black nor white but somewhere in between in terms of effective pedagogy (see for example the special issue ‘Design Education: Teaching in Crisis’ in *Design and Technology Education*, edited by Jones & Lotz, 2021; also Fleischmann, 2021, 2022).

The ‘living lab’ during the Covid-19 pandemic spawned several strategies to best apply technology to physical studio pedagogy. Desai et al. (2021) relied on pre-recorded videos that could be accessed online in a multi-national project. Şalgamcıoğlu and Gen (2021) found that design and architecture students used the digital communication platform Discord to meet in rooms they called, ‘studio’, ‘library and canteen’ as well as WhatsApp group chats. Thompson et al. (2021) identified that online learning environments need to nurture a sense of belonging and student engagement to successfully make the jump from a physical studio to an online studio, while Fleischmann (2021) found that design domains impact the success of online studios; educators who taught hands-on domains such as fashion and product design showed little enthusiasm for online studios because of the need to teach skills on bespoke equipment.

Researchers who explored the impact of Covid-19 on how they structured their pedagogical approach to replicate the characteristics of the physical design studio faced numerous social and psychological obstacles as well as unexpected successes. Cho et al. (2022), for example, found that students had difficulties communicating and collaborating with other students in virtual courses largely because they felt no sense of community, a recurring theme in current pandemic research of studio pedagogy (e.g., Fleischmann, 2020c, 2022; Marshalsey & Sclater, 2020). Nubani and Lee (2022) called this informal peer learning the Sense of Classroom Community (SCC) and found that the SCC was "significantly" lower in the online interior design studio which resulted in "lower levels of learning" compared to the physical studio.

However, Nubani and Lee (2022) also identified advantages of online learning that included one-on-one virtual meetings with faculty and screen sharing that allowed digital mark-ups—a finding also made by Fleischmann (2020c), Hepburn and Borthwick (2021) and Tessier and Aubry-Boyer (2021). Despite many identified difficulties during the transition, some design educators found the online learning environment of benefit for design students. A study with a group of international design educators revealed that “online design studios can work well when critiquing student work online. Using online cloud-based technologies for critiques is considered effective in facilitating peer/teacher feedback and successful in documenting the creative progress of students online” (Fleischmann, 2022, p. 266)—a finding supported by Tessier and Aubry-Boyer (2021). Ellis and Grieve (2021) explain that “[m]any students excelled within the online delivery, exhibiting the characteristics aimed for the 21st century learner: committed, adaptive, goal orientated, and inherently self-motivated” (p. 414)—a finding supported by Iranmanesh and Onur (2021). And Smith (2022) acknowledges benefits of the virtual learning environment that include international guest lectures, research interviews and access to digital resources during online tutorials.

## Research Design and Methods

Given that prior to the Covid-19 pandemic outbreak, the overwhelming majority of design educators globally were opposed to teaching design online (Fleischmann, 2015, 2021; Wood, 2018) the author queried design educators from Germany to gauge their responses to the loss of the physical design studio and shift to online design studios during the pandemic and whether two years after the pandemic, changes have been made to how design is taught and learned in Germany today.

This research is underpinned by the epistemology of pragmatism (based on Pierce and Dewey) which as a philosophical stance “understands knowing the world as inseparable from agency within” (Legg & Hookway, 2020; Kaushik & Walsh, 2019). Taking a pragmatic approach in this research context meant selecting methods that go to the heart of the research question to measure German design educator attitudes toward online technology (Maxcy, 2003; Teddlie & Tashakkori, 2009). The researcher could therefore select research methods that suit the real-world practice nature of the situation (Morgan, 2014; Teddlie & Tashakkori, 2009). An online survey in Stage 1 and an online survey with follow-up interviews in Stage 2 were considered the most appropriate research methods to be used. The decision to use an online survey was driven by the advantage of accessing large numbers of participants, who are geographically dispersed, in a short timeframe. The widespread use of video conferencing tools caused by the pandemic also allowed for follow up interviews to be conducted in a timely and cost-effective manner.

### Research Stage 1: During the Pandemic (Survey 2020)

To gain a meaningful understanding in the middle of the first wave of the pandemic (May–September 2020), the author set out to explore the experiences of German design educators across higher education institutions (Universities and Universities of Applied Sciences). Contact details of potential participants were randomly selected from staff profile pages of design departments publicly available on websites of German Universities and Universities of Applied Sciences.

The online survey was sent to a total of 209 contacts of which 23 contacts were invalid. Responses were anonymous. Overall, 33 design educators completed the survey conducted using the online survey platform SurveyMonkey (response rate 18%, see Table 1 for participant details). Questions were designed to not only return data on measurable indicators (e.g., Reflecting on your experience to date, has your view of teaching design online changed since then? Yes, No) but were also to collect qualitative feedback through open-ended questions (e.g., Why has your view changed/not changed?).

Examples of questions asked in Stage 1:

*Q: Can you describe how your teaching has changed during the Covid-19 crisis?*

*- (open-ended).*

*Q: What was your opinion on studying design online before the Covid-19 crisis? I thought...*

*Answer Choices: Design can better be taught on campus/Design can be taught online/Other (please specify).*

*Q: Have the experiences you have had with online teaching over the past few weeks made you change your mind about it?*

*Answer Choices: Yes/No.*

*Please explain why and how your view has changed or why not (open-ended)*

### **Research Stage 2: After the Pandemic (Survey and Interviews 2022)**

Two years later (September-October 2022) a follow-up survey, which explored whether design educators had changed their approach to teaching design, was sent to the same group of German design educators (209 – 23 = 180). Although the same group of educators were invited in both surveys, focusing follow-up questions on individual participants was rendered impossible by survey anonymity. The second survey questions explored specific attitudes toward online teaching, use of online teaching strategies in the post-covid design studio and their potential future use. Thirty-two German design educators completed the survey (response rate 17%). Like the first survey, the second survey included closed-ended questions to generate measurable indicators and open-ended questions to explore in more depth what changes to German design educators teaching practices have/have not occurred and why.

Examples of questions asked in Stage 2:

*Q: 69% of design educators see a mix of online and face-to-face teaching as a viable approach for the future. How does it look today? Two years later, has anything changed in your design class? Do you now include online teaching and learning methods in your teaching?*

*Answer Choices: Yes/Not yet, but I'm working on it/No.*

*Please explain your answer. If you answered 'yes' or 'not yet', what online methods are you integrating now or planning to integrate soon and why? If you answered 'no', please explain why not? (open-ended).*

*Q: Are you ready to integrate more online teaching and learning methods into your design teaching over the next five years?*

*Answer choices: No, I haven't integrated anything yet and won't do so in the near future/I'll probably continue to use the online methods I'm using now/Yes, I will integrate more.*

*Please explain your answer (open-ended).*

Follow-up interviews were used to gain a deeper insight into the researched phenomena and develop an understanding how the future of design education is seen in Germany. Six design educators volunteered their time with interviews of between 30-60 minutes conducted via video conferencing software (see Tables 1 for participant details). Semi-structured interviews were chosen as a “good way of accessing people’s perceptions, meanings, definition of situations and construction of reality” (Punch, 2009, p. 144) and align with the inductive nature of qualitative research (Galletta & Cross, 2013).

**Table 1. Number of survey and interview participants across design domains**

Design domain	of 33 survey participants during pandemic (Stage 1)*	of 32 survey participants after pandemic (Stage 2)*	of 6 interview participants after pandemic (Stage 2)
Graphic/Communication Design	18	12	2
Product/Industrial Design	5	5	2
Interaction/Interactive Design	8	9	1
Game Design/Animation	1	-	-
Design Thinking/Social Design	-	4	-
Interior/Spatial Design	4	2	-
Fashion Design	-	4	-
Design Research/Theory	2	11	1
Jewellery Design	1	2	-

*\*some design educators teach in more than one domain*

Note: The author acknowledges that specific design domains are represented by smaller survey and interview sample sizes and are therefore not representative of all of Germany. Nevertheless, this research gives valuable insights into the German design educators perspectives despite smaller sample sizes.

### Data Analysis

The general approach to data analysis was inductive and had an overall drive of exploration and discovery (Morse & Niehaus, 2009). The qualitative data obtained through open-ended questions in the survey and interviews were analysed using a thematic analysis which involves interpretation of data, creating and selecting codes and constructing themes (Kiger & Varpio, 2020). It is a helpful method for exploring the different perspectives of research participants by revealing similarities, differences and potential unexpected insights (Braun & Clarke, 2006; King, 2004). The qualitative data were first coded in broad coding categories depending on the question: for example, 'challenges' and 'opportunities'. Within these categories various themes emerged which are phrases to describe a broader or overarching idea, for example, 'lacking human interaction'. Similar or same codes were combined into subthemes and are presented according to their importance (higher occurrence more important) (Thody, 2006).

Qualitative data was also quantified (counting number of mentions) (Thody, 2006). That means more data for a particular theme indicates its validity, making it possible to evaluate it as more or less important (Tashakkori & Teddlie, 2003; Thody, 2006). The qualitative data were coded using the research analysis software NVivo. Themes are presented with the number of times mentioned in brackets [ ] and are sorted from high to low. Representative quotations from participants are presented to illustrate the themes which emerged during the data analysis (Educator-S = survey; Educator-I = interview).

For Stage 2, the data collected through survey and interviews were triangulated (multiple methods and data sources). The triangulation of data obtained through different methods (survey and interviews) provided corroborating evidence for the conclusions drawn, e.g.

validation technique (Bazeley, 2004; Johnson & Christensen, 2008; Teddlie & Tashakkori, 2009). Triangulation enabled comparisons to determine if findings were congruent and allowed a deeper understanding of the researched phenomena (Johnson & Christensen, 2008; Punch, 2009; Teddlie & Tashakkori, 2009). For the analysis of the quantitative data obtained through the survey, SurveyMonkey delivered basic statistical data, including the tally of response totals, percentages and response counts.

## Findings

### Stage 1 Findings: The Move to Online during the Pandemic

Thirty-three German design educators who represent 18 government funded higher education institutions responded to this survey during the pandemic; all but one swapped their classes to an online delivery and one educator was already teaching design online before the pandemic. Prior to the start of the pandemic, more than two-thirds of the design educators, 74%, thought that design can be better taught face-to-face, a view reflected in the response of 87% of design educators who felt there is some content and skills that cannot be taught online; 13% felt they could teach everything online.

Survey respondents' immediate technology fallback position, like their international colleagues (Fleischmann, 2021), was to use Zoom or Webex for live classroom contact (video conferencing tool), Slack (a communication and file sharing platform), Miro (a cloud-based collaborative whiteboard), email, and mobile phones. There was near unanimity among German design educators (91%) who thought their workload was higher when teaching design online compared to teaching face-to-face on campus, while a minority (9%) experienced the workload as about the same.

### *A Shift in Perceptions During the Pandemic: Blended Design Studios in the Future*

Based on the experiences of German design educators during the Covid-19 pandemic 69% said they would proceed with a purposeful mix of online and on-campus classes (blended teaching) after the pandemic has ended. In sharp contrast, 31% of the German design educators would continue with on campus teaching only. All 33 German design educators rejected online delivery and could at the time not envision design courses being offered fully online whether in a synchronous or asynchronous mode.

Despite strong negative opinions regarding teaching design fully online as expressed by this educator: "Any online content is a crutch for sick times" (Educator 12-S), survey responses indicate a shift into accepting that online tools and teaching methods can be a welcome addition to teaching design. The reasons for accepting online tools are reflected in respondent observations that "online worked better than expected", online teaching can "be very efficient and enriching" and that "hierarchies blur or disappear in the online space." (Educators 7, 11, 32-S)

Communication efficiencies were also cited as a positive switch to online cloud-based platforms as expressed by this educator: "There are tools such as Zoom, Miro and Slack that make it possible to communicate directly and easily with the students and to gain insights into their working methods. The teams can also communicate with each other and work collaboratively." (Educator 6-S)



Overwhelmingly this group of design educators single out the fragmentation of social interactions in an online setting as the largest critique of the online studio.

German design educators who still opted for on campus education being the most effective for design education (31%) regardless of positive or challenging experiences, gave the following reason for online's deficiencies:

- the most important is the insufficient human interaction and communication because design students learn from each other and through interaction and exchange with each other [7]
- the development and assessment of three-dimensional designs, prototypes, products and use of materials cannot be done online [5]

Design educators' largest concern for students was the isolation in front of the screen and the lack of informal exchange and student life. One design educator noted: "Not only the courses but also the exchange among the students is important for the design degree. Exchanging concepts and mindsets with other students is an important part of finding your own position in the design environment. Access to workshops and computer rooms also accelerates learning progress compared to isolated work (at home)." (Educator 17–S). However, many design educators acknowledged online technology could have a supportive role to strengthen the on-campus education, as this educator explains: "A large part of design is learning tools and methods. Some of these methods can also be taught online." (Educator 31–S)

### **Findings Stage 2: The Design Studio Today: Post-Covid-19 Changes**

Given the willingness of German design educators to proceed with a blended teaching approach in 2020 (69%), the second part of this study set out to explore what has changed two years later. Did German design educators integrate more online teaching in their design courses and consequently offer their programs in a blended mode? What online strategies have been selected by these educators?

#### *A Blended Design Studio Emerges: An Acceptance of Online Tools Supporting the Physical Design Studio*

Seventy-five percent of the German design educators who participated two years after the initial survey and when teaching had returned to 'normal', now include online teaching and learning methods in their teaching, while a further 6% are working on it; 19% do not include online methods in their classes.

The following online strategies are now used in support of on campus teaching:

- video conference tools for meetings, project discussions and feedback [12]
- cloud-based collaboration tools (such as Miro) for group and individual projects to have continuous insight (24/7) into projects [6]
- pre-recorded lectures/tutorial content for technical basics [6]
- online presentations [5]
- guest presentations/lectures from experts who otherwise would need to travel [2].

A typical blended teaching approach is described by this German design educator: "I use the online tools introduced in 2020 to support, among other things, the development of semester performances, to give feedback or to provide the students with additional information and materials." (Educator 4-I).

The 19% of design educators who do not include any online tools give the following reasons:

- design is a process that thrives on direct, personal exchange [3]
- online lessons are not suitable for teaching artistic practices [2].

### **The Future Game Changers: Work Environments and Artificial Intelligence (AI)**

Within dynamic changes brought on by the pandemic there is the awareness that after post-Covid-19 lockdowns, not everyone works in an office anymore, particularly designers; as is expressed by this design educator: "Maybe collaboration will change in the creative agencies so that everyone works together online from the home office. If this is the case, our teaching should also be online and we should teach students how to work in such an environment." While being open to adapt to workplace requirements, the same educator continues: "However, on campus teaching will always be important, it is a special experience to feel haptics, energies and people in the room. This has a significant impact on creative processes." (Educator 4-I)

The internal debate between design educators in Germany about the efficacy of integration of online teaching and learning methods in blended programs is overshadowed by the rapid development and the impact of Artificial Intelligence (AI) in design practice and education. During the post-Covid-19 interviews, four participants commented that AI is a game changer in design education. Three of those four speculated that graphic/communication design as an education subject is severely endangered by the rapid deployment of AI and may not be offered as a subject at higher education design schools in ten years. One educator commented: "AI changes a lot of design processes, which can be very time-consuming. When designing, usually a very intensive examination of the subject is required. In the future a computer is fed with keywords and probably after three minutes about 40 different designs and drafts are spit out. Of course, this raises the question: Will there still be design-oriented courses at all? Will they still be necessary? And my prediction is no, they won't be necessary." (Educator 6-I)

### **The Future of Design Education in Germany: Factors Driving and Inhibiting Change**

There is agreement by survey and interview participants that teaching parts of their classes online is possible when class sizes are between 5 to 12 students depending on content and design domain. Overall, 35% of design educators who participated in this study two years after the initial survey can imagine teaching design courses or design degrees fully online within the next 5 to 10 years.

Despite these positive views about using online technology for teaching and learning design, only 9% of design departments of these German universities are considering offering online courses or programs but have not committed to a firm timetable to roll those out. Why is that?

The interviews opened a floodgate of criticism of political roadblocks to change, with all interviewees reporting that the university directive driven by local politics is to return to campus no matter what. One educator said online teaching “is not (currently) desired by the university management.” (Educator 2–I).

A major roadblock to implementing online design education in Germany is that universities are funded by actual student seats at a physical campus so online education represents a threat to their funding. There is also a fear by German leaders that online education will just reinforce social isolation in students. One design educator explains: “200,000 young people have been “lost”. After graduating from school, they do not appear in an apprenticeship or in any school. Politicians fear that online teaching will reinforce this lack of social integration” (Educator 2–I). Another educator commented: “My university has also seen a huge increase in mental illnesses, which shows how important face-to-face teaching is for young people. Not only the teaching content is relevant, learning as a social and interactive process obviously cannot be replaced.” (Educator 5–I)

### **Data Security Laws and Online Progress**

Another roadblock to the institutional acceptance of implementing more online components into design education is based on data security laws in Germany which prohibit student data storage in servers not located in Germany. “We need EU-hosted, data-efficient and secure tools!” commented one educator (Educator 14–S).

Participants in the interviews also explained that Learning Management Systems (LMS) such as Blackboard or Moodle were mostly non-existent in universities at the onset of the pandemic; students did not have a university email address and data security laws makes it difficult to use open-source tools such as Google Docs. To overcome these obstacles, some universities have started developing their own content management and communication tools during the pandemic –with at least one of the interviewees reporting that the project is ongoing.

### **Discussion**

The findings from a group of German design educators presented here demonstrate a consistency among design educators globally to adapt their teaching to incorporate technological changes (Fleischmann, 2021; Jones & Lotz, 2021) but reveal at the same time a pessimism about implementing those changes institutionally based on governmental roadblocks. The findings of this study (Stage 1 during the Covid-19 pandemic) largely align with previous findings about the rapid adoption of online technology. Like their international counterparts (Fleischmann, 2021; 2022), this group of German design educators experimented with communication and file sharing technology during the pandemic and the majority (69%) reflected positively on their usefulness to support the physical design studio as a blended learning and teaching environment—the same percentage as their international colleagues (Fleischmann, 2021, p. 120). This study also confirms this group of German design educators had problems creating the social cohesion of physical design studios with their associated opportunities for informal learning (e.g., Fleischmann, 2021, 2022; Nubani & Lee, 2022; Spruce et al., 2021).

German design educators in this study who formally supported only face-to-face design classes before the pandemic (74%) began realising there were benefits to teaching online; in Stage 2 of

the research three-quarters of German design educators (75%) were continuing to use online teaching methods two years later. Indeed, there was a major attitude shift in that 35% of German design educators could even see design being taught fully online within the next 5-10 years—a thought not possible two years earlier and also not shared at the time by their international counterparts where research showed “there is virtually no support for fully online classes in design education regardless of design domain—whether it is asynchronous or synchronous” (Fleischmann, 2021, p. 125).

Ironically, the salubrious effect of the Covid-19 pandemic on design education was the rapid deployment of online technology which forced design educators to align their pedagogy with contemporary design digital practices. This assimilation of technology transformed educator acceptance of a blended mode of teaching, a finding in many current (e.g., Dabaghi & Arbid, 2023; Fleischmann, 2021; Kamalipour & Peimani, 2022; Nubani & Lee, 2022; Smith, 2022) and pre-pandemic studies (Fleischmann, 2020a, 2020b).

Despite some educators embracing a fully on campus face-to-face teaching paradigm, there is a general acceptance among design educators in this study and previous surveys conducted by the author (Fleischmann, 2020c, 2021, 2022) that online technology has a role to play in the future of design education in various applications, such as online critiques and collaboration. However, there appear to be conflicted attitudes toward the implementation of online teaching strategies amongst this group of German design educators. These conflicts were discovered in three dominant areas.

First, a deeply ingrained conviction that face-to-face design education on campus with interpersonal exchanges will always prevail because this ‘in-person’ dialogical learning (Crowther, 2013; McLain, 2022; Shreeve, 2011; STP, 2009) is part of design’s signature pedagogy which McLain (2022) asserts can take hundreds of years to develop. As this study confirms, ‘design is a process that thrives on direct, personal exchange’ and that “online design studios fall short in approximating the nuances of dialogical learning and creating a studio culture” (Fleischmann, 2022, p. 267; Nubani & Lee, 2022; Smith, 2022). This conviction prevails despite the positive experiences when using online technology by the majority of German design educators as well as with their international colleagues during the pandemic. (Fleischmann, 2021, 2022; Jones & Lotz, 2021).

The second major conflict that emerged from the findings is that German design educators were resigned to stopping further exploration of their online practices on return to campus because online teaching strategies were not supported by university management. This lack of institutional support was cited as a major factor in returning to the more traditional approach to design education found in face-to-face studios. Motivations to have students learn in on campus classrooms are twofold: German universities are funded by actual student seats at a physical campus and design departments in Germany must comply with local and federal mandates or risk losing funding for their programs. There is also a fear that the Covid-19 pandemic damaged students psychologically and that remote learning would exacerbate the problems.

There are other institutional roadblocks that have been erected by the German government, which include data and privacy laws which prohibit the offshoring of student data on servers not located in Germany. On a micro level this means that cloud-based platforms, such as

Google Docs or Miro cannot be used in student projects unless these services provide server locations that comply with the German General Data Protection Regulation (GDPR) (Miro Community, 2023).

This back-to-campus edict is not isolated to German universities. The author's institution is also pressing students (and educators) to attend physical classes despite a student demand for the flexibility and convenience afforded by online design classrooms which require further financial investments from educational institutions and increase educator workloads, a common complaint by design educators (also in this study) who were new to implementing online technology at the pandemic's outset (Fleischmann, 2020, 2021; Hepburn & Borthwick, 2021).

The third major issue bedeviling German design educators is the rapid deployment of Artificial Intelligence (AI) and its current use in Higher Education, not only in Germany but globally. While German design educators contemplate the incorporation of more online elements into their design studios, they realised that they face rapid technological advancements in the form of Artificial Intelligence which is seen by some in this study as potentially hollowing out design's creative core. This was cited in interviews with educators who see a future where designing a logo, for example, may happen within seconds when fed into a computer that is operating on a database of keywords. This unemotional, machine produced design is completely anathema to studio pedagogy, whether it is online or physical.

As has been widely publicised in the popular press, AI can be used to generate everything from philosophical treatises to designing dozens of logo variations. AI places a new burden on design educators to verify original work. While the Internet is a powerful tool that can be searched quickly, AI has crossed a new technological threshold that raises a set of new, sticky problems particularly in assessing student work. Already design educators are incorporating AI into their curriculum in a limited way to re-produce repetitive tasks such as generating animation templates (e.g., Tang, Li & Tang, 2022). In the author's visual communication design course students already have the option to explore AI tools but must critically engage with its ethical challenges, potential copy right issues and its blind reinforcement of societal stereotypes (see Lawler, 2023; Solly, 2019).

## Conclusion

This research was designed to explore the efficacy of online technology among German design educators during and after the Covid-19 pandemic. What it revealed are questions and considerations of a more profound nature that encompass design pedagogy.

The Covid pandemic opened the eyes of German design educators who were previously reluctant to incorporate online technology in their design classroom before Covid-19 shut down classrooms. Like their global counterparts, German design educators had to re-invent the studio classroom digitally. This meant the adoption of online communication and file sharing platforms where possible.

The results presented in this research clearly indicate that a select group of design educators in Germany who participated in this study had dramatically shifted their perceptions about the utility of online learning in design education. Indeed 75% of participants are now using online technology to enhance the physical design studio in their teaching—a blended strategy—while others (6%) are working on incorporating a blended approach.

Yet, this group of German design educators appear torn between the wish to use more online teaching technology and gripping tight to the past when it comes to studio pedagogy, while at the same time some are casting their vision to the future when identifying technology, in the form of AI, as a potential threat to some design domains.

Despite this shift in attitude, there are several external factors that are blocking the widespread adoption of online technology in Germany's post pandemic design classroom. This research uncovered three major areas of resistance in adopting online facing German design educators. Foremost among them is a policy by German Universities to have students return to face-to-face classrooms in order to receive government funding that is based on students attending physical classes.

One of the foundations of online learning is the accessibility of open-source platforms, such as Google Docs. However, data security laws in Germany make it difficult if not impossible to access these open-source platforms so students can communicate and collaborate over the Internet. These platforms, such as Miro, Zoom and Slack, which were used internationally by design educators during Covid-19, would face formidable government obstacles in Germany if not outright prohibition unless the student data was stored on servers in Germany.

In Germany there is also an institutional fear that online design education means further social isolation of students who are still anecdotally experiencing psychological damage from long periods of isolation during Covid-19, which would further jeopardise the socialisation process of the physical design studio. And there is the practical matter cited by design educators who teach hands-on skills (e.g., Product design, Jewellery design) of needing to use specific equipment in face-to-face studio spaces to teach and learn specific hands-on skills—a problem voiced internationally (Fleischmann, 2021).

Overshadowing data concerns is the sudden expansion of Artificial Intelligence in education. Many thought leaders who are promoting it, say AI tools such as ChatGPT represent the next major technology revolution. The generative capacity of AI to create original work after learning from its millions of users is what concerns educators who think students will present AI generated output as their own work. Sceptics and early adopters argue that AI can never replace the nuanced thought process of critical thinking and that AI is fallible. Yet design programs must address AI as a technology that can be a powerful tool, not a threat. The reality is that the design profession has always been adaptable to change. It is clear from the findings in this research that German design educators, like their international counterparts, can adapt quickly.

This research has revealed that the discussion of the application of online design education needs to be broadened to include complex policy issues as well as rapid advancements in technology (AI). There is scope to conduct further research on how online design education and AI intersect. It is unclear at this point what influence AI will exert on design studio pedagogy as a tool to teach and learn.

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