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Fashion and game design as hybrid practices: approaches in education to creating fashion-related experiences in digital worlds

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ABSTRACT

Collaborations between fashion and digital game design practitioners are intended to provide new fashion-related experiences in digital worlds, yet often result in garment designs that resemble physical equivalents rather than constituting innovative experiences. This research aimed to investigate possible criteria for developing digital design practices in higher education in fashion design that are informed by industry experts' experiences of fashion and digital game design. Specialists from both industries were interviewed to investigate how fashion design practices can create meaningful content for digital worlds. The findings suggest that fashion design practitioners in higher-education need to better understand the technical and socio-dynamic peculiarities of digital worlds to create meaningful fashion-related outcomes, rather than recreating physical fashion in the digital realm. The findings further suggest that fashion designers would benefit from learning about digital software, tools, and methods that are shared by digital-native design disciplines to allow for connected workflows.

1. Introduction

The increasing digitalisation of the fashion field challenges the industry and higher-education institutions to develop new practices for designing and sharing digital fashion-related outcomes with increasingly digital-native demographics (Bertola & Colombi, 2021; Iannilli & Spagnoli, 2021; Sun & Zhao, 2018). Consequently, growing customer bases favour experiences over products (Hunt, 2005), leading fashion designers and brands to collaborate with digital-native design disciplines to address the needs of customers who seek value in immaterial, experience-based design outcomes (Särmäkari, 2021). These observations find support in recent collaborations between high-profile fashion brands and game developers, which have opened up for new possibilities for designers in both fields to explore and define the roles of garments in digital environments (Gibson, 2021; Makryniotis, 2018). The game developer Square Enix dressed their in-game avatars in digital garments designed by Prada (Robertson, 2012), Louis Vuitton (Lidbury, 2016), and Vivienne Westwood (Christmas, 2017) in the *Final Fantasy* franchise. Similar collaborations were seen between brands and developers with Moschino and *The Sims 4* (Ashcroft, 2019), Valentino and *Animal Crossing* (Gibson,

2021), and Balenciaga and *Fortnite* (Cole, 2021), while brands like Louis Vuitton (Northman, 2021), Burberry (Zhang, 2019), and Balenciaga (Madsen, 2020) have collaborated with game developers to create their own virtual worlds that allow their customers to explore and interact with the brands' design philosophies in a playful manner. In Balenciaga's digital game experience from 2020, *Afterworld: The Age of Tomorrow*, players explored a dystopian city in which avatars and non-playable characters were dressed in the latest collection of the brand, allowing them to experience the collection from a first-person perspective using virtual-reality technology (Ibid.).

While these collaborations show increasing interest on the part of the industry to deliver digital fashion-related experiences, fashion design programmes in higher-education are primarily concerned with the implementation of three-dimensional computer-aided design (CAD) tools for digitally designing and constructing physical products (Bain, 2022; Papachristou, Kyratsis, & Bilalis, 2019; Siersema, 2015). Three-dimensional CAD software packages such as CLO3D and Browzwear, which are tailored to fashion-design practice, are often part of modern fashion-design curricula on the basis of improving garment-development

processes through rapid prototyping (Siersema, 2015), zero-waste thinking, and construction methods (McQuillan, 2020), and as a means of improving how design ideas are communicated in peer and teacher interaction (Lee et al., 2021; Santos, Montagna, & Neto, 2020). However, it may prove to be valuable to also approach digital tools in higher education as means of creating alternative fashion-related experiences for digital and hybrid spaces, introducing students to possibilities beyond the construction of physical products through digital means (Bain, 2022; Bertola & Colombi, 2021; Särmäkari, 2021; Tepe, 2022; Varra, 2021). Doing so could help future generations of digital-only fashion designers to break with traditional norms and ideals relating back to fashion's physical heritage, which are still commonly employed by current digital fashion brands, to develop practices and values particular to digital environments (Logaldo, 2016; Särmäkari, 2021; Särmäkari & Vänskä, 2022; Thiel, 2017). Examples of such educational approaches can be seen in London College of Fashion and its Fashion Innovation Agency, which explores alternatives to creating fashion with digital tools for digital environments (Fashion Innovation Agency, 2021). There, design students are encouraged to engage with digital tools and digital game-related software that is not commonly used in a fashion-design context (Ibid.).

Such examples represent a minority of higher-education fashion design institutions, in that they seek to provide more diverse approaches to digital fashion and digital tools. This suggests that more research is necessary in order to identify how higher education in fashion design could consider the integration of digital tools for the development of techniques, methods, and concepts for an evolving design discipline in the context of its digitalisation. Identifying the possible limitations for how higher education engages with digital technologies and digital worlds in the context of digital-native design disciplines, such as digital game design, may help to suggest strategies for regarding, practicing, and experiencing fashion design in digital worlds in more contemporary and considerate ways.

The research presented in this article aimed to contribute to this discourse through in-depth interviews which were intended to i) identify current strategies in the field of fashion design for approaching digital tools and digital environments, and ii) suggest possible criteria for changing fashion design practices in higher education from the perspective of industry experts in fashion and digital game design.

Firstly, a contextualisation is made to compare the roles and required skillsets of fashion designers and character designers for digital games. Secondly, the qualitative methods that were applied are presented, followed by an analysis of the interviewees' comments. Thirdly, the findings of this research are contextualised based on scholarly and journalistic references.

2. Related studies

2.1. Fashion design training in higher education

Within higher education, conventional fashion design training puts emphasis on developing skillsets that are connected to techniques within a physically based practice (Faerm, 2012). The training is often studio- and project-based and circles around developing collections that showcase and present knowledge of construction, form, materials, and sensory experiences that relate to the relationship between the body and dress (Faerm, 2012; Seixas, Montagna, & Félix, 2021). These are some examples of practical processes that can be substituted with digital ones, but with design methods and techniques such as experimental draping, knitting and weaving this is not possible (Gu & Liu, 2019).

Fashion designers are educated to design stories and concepts in the context of emerging trends and zeitgeists (Nixon & Blakley, 2012), as well as to develop technical skills and embodied knowledge of garment construction (Faerm, 2012). Through this two-fold training, fashion designers learn to combine the socio-cultural aspects of fashion with the commodified, functional, and wearable aspects of clothing (Kawamura, 2005, p. 3). This duality is crucial to traditional fashion design yet different in digital fashion, and even moreso in hybrid game-fashion design practices, as commodification, functionality, and wearable aspects are less important in digital environments (Särmäkari & Vänskä, 2022).

2.2. The interconnections of disciplines within digital games

The development of digital games requires a diversity of disciplines and professions working together, as shown by Wang and Nordmark (2015), and this is reflected in higher education in game development (Engström, Lyu, Backlund, Toftedahl, & Rosendahl Ehmsen, 2020). Students work on projects and demonstrate their knowledge by solving problems or building artefacts through co-creation within interdisciplinary setups (Ibid.). This form of project-based learning involves team configurations that include both programmers and artists, who through peer-reviewing processes mimic the team compositions of professional game development settings (Ibid.).

Within such interdisciplinary setups, character designers not only design garments but characters who, through their clothing (or 'skins'), align with the overall concept of the game and inform players about the game's narrative (Scarbrough, Panourgias, & Nandhakumar, 2015). Within this process, characters' physical (sex, age, physique), sociological (class, occupation, nationality, political affiliations) and psychological (moral standards, frustrations, temperament, biases) dimensions are taken into account (Lankoski, Heliö, & Ekman, 2003). In developing characters, character designers' skillsets span from rough initial drawings as part of an ideation phase to additional development and polishing of designs through three-dimensional modelling and further development of these using texturing tools (Hagen, 2012). Furthermore, the designs are tested within the game engine to ensure consistency with the overall game concept, as well as with the in-game experience of the character (Ibid.). The character's dimensions can, depending on the concept of the digital game, be customised to varying extents by the player or pre-defined by the developer (Salomaa, 2021).

2.3. Digital garment creation from an interdisciplinary perspective

Studies have shown that the increasing adoption of digital technology in the field of fashion design create opportunities for new methods and skillsets to enter fashion design processes, leading to a more diverse array of practices and practitioners from multiple disciplines exchanging artistic and technical knowledge. For example, Särmäkari and Vänskä (2022) introduce machine designers as new players in fashion design practice: By following the work processes of a generative clothing designer and trained mechanical engineer, they see opportunities for mathematics and computer science researchers to augment human creativity, thereby challenging the traditional role of the fashion designer. Similarly, Varra (2021) sees increased expectations for hybridity across multiple areas within the fashion design sector, where traditional skillsets blend with modern ones. This skill combination is also explored by Särmäkari (2021) in relation to digital fashion companies such as Atacac and The Fabricant, which utilise experiences of physical practice to translate knowledge of haptic handling and thinking into hyper-realistic digital spaces. As argued by Särmäkari and Vänskä (2022), these digital transformations are not 'de-professionalisations' of fashion; rather, 'all these transformations re-professionalise it' (2021, p. 218).

In the context of digital games, the costume designer Heli Salomaa's work for the Finnish game developer Remedy Entertainment, and their digital action-adventure game *Control*, exemplifies the idea of interdisciplinarity. The design process for the main characters and NPCs (non-playable characters) alternated between physical and digital environments, and Salomaa applied knowledge gained from the physical practice into the digital one (2021). This approach to developing garments for digital games is strongly linked to the context and character of the game itself rather than to a wider demographic, as is often the case for garments designed in the context of conventional fashion design practice.

Although examples of digital fashion and costume design for digital games exist, few studies have investigated the possible contributions of fashion design as a discipline and fashion designers' skillsets in the context of digital games (Makryniotis, 2018), despite the strong connections between character design for digital games and fashion design.

Table 1. List of interviewees.

List of interviewed specialists		
Fashion design	FD1	Co-founder of an independent digital fashion brand
	FD2	CEO and founder of a digital fashion brand and factory
	FD3	CEO and founder of a digital fashion brand
Digital game development	GD1	CEO and co-founder of an independent digital game development studio
	GD2	Junior concept artist at an internationally renowned digital game development studio
	GD3	Art director at an independent digital game development studio
At the periphery of either of the two	P1	CEO and co-founder of a digital fashion brand
	P2	Freelance editor specialising in digital fashion
	P3	Director of business development at a major technology corporation

3. Method

In-depth interviews were conducted with experts from the fashion and digital game industry to collect qualitative data based on their experiences and expertise. This allowed criteria that could be used to move fashion design in higher education towards a more digitally inclusive and accepting design discipline to be mapped.

3.1. Theoretical background

As the tools of investigation for this study, in-depth interviews allowed the experiences, motives, and opinions of the target group to be explored in detail in

order to establish a better understanding of the research problem (Rubin & Rubin, 2012). The interviews followed an interpretivist epistemological approach that considered the social world in relation to the participants' experiences and points of view (Ormston, Spencer, Barnard, & Snape, 2013).

The collected data was analysed using a constructivist epistemological approach that allowed meanings and interpretations to be formulated based on the participants' answers (Ormston et al., 2013). A thematic analysis was used to find patterns and clusters of meaning within the data (Spencer, Ritchie, Ormston, O'Connor, & Barnard, 2013).

3.2. Recruitment of participants

Nine specialists from the fashion and digital game industries were recruited as participants for this study between September 2021 and January 2022. The recruitment of participants for the interviews was based on professional experience in either of the two industries, as well as knowledge regarding collaborations between fashion design and digital game design practitioners (see Table 1). The objective was to gather empirical data from professionals and the founders of businesses in both fields to acquire practical knowledge of the needs of the hybrid fashion-gaming industry to facilitate the development of higher-education programmes in fashion design.

3.3. Interview procedure

The interviews were intended to last for approximately 40 min, during which time the same eight questions were asked of all of the participants. These questions

Table 2. The questions asked during the interviews.

Question structure for the interview procedure

Group 1 – Introducing the field of investigation
Q1: What do you think are the biggest differences between a) fashion and digital games, and b) digital-game fashion and real-life fashion?
Group 2 – Getting to know the participants' backgrounds
Q2: How do you think fashion design companies see digital game companies and vice versa?
Q3: Based on your background and experiences, where do you see possible connections between fashion and digital games? Where do you see barriers between the two?
Group 3 – Emerging challenges and opportunities for designers
Q4: What do you think collaborations between actors and stakeholders in fashion and digital games should look like?
Group 4 – Informing alternative design practice
Q5: Do you see a need for hybrid designers?
Q6: What do you think that fashion designers can learn from character designers for digital games?
Q7: What do you think that character designers for digital games can learn from fashion designers?
Group 5 – Implications for education
Q8: How does higher education in fashion design need to change in relation to its digitalisation?

were grouped into five categories to clarify the purpose of each (see Table 2). Follow-up questions were used as needed in order to deepen understanding of the interviewees' points of view.

Academics from both fields were present during the interviews to ensure a high-level understanding of the answers given by the interviewees: two experts in academic fashion design, and two in digital character design and 3D modelling attended the interviews. All of the interviews were conducted online via Zoom and video-recorded; transcripts were later made using these recordings, constituting the research data.

3.4. Data analysis

A three-step thematic analysis of the interview data was conducted; this involved discovering, interpreting, and reporting patterns of meaning within the data (Spencer et al., 2013). The interview data was first labelled and sorted as part of the 'data-management process'. This was followed by a 'summary and display of data', which involved creating a preliminary overview of the identified patterns and themes by developing a matrix-based format in which the sorted data was organised. Lastly, 'abstraction and interpretation of data' was used to formulate analytical concepts and themes, which were explored to create patterns of meaning. This approach i) facilitated the mapping of current competencies in the industry and higher education with regard to digital technologies, and ii) suggested potential improvements in digital fashion design practices in academia and industry on practical and systemic levels.

4. Findings

In order to better map the range and diversity of arguments made by the interviewees, the findings of this study were divided into three sections, which are outlined in tables below. Each presents the interviewees in three groups in rows, organised based on their professional backgrounds, and the common dimensions in columns, organised based on the interviewees' shared perspectives. Based on these tables, links between the key concepts were defined to facilitate the identification of patterns through associations between phenomena.

4.1. Changing relations between fashion design and character design for digital games

The data presented in Table 3 suggests that, while technological differences between fashion design and digital game design are becoming smaller in terms of practices, there still exist conceptual differences relating to the

Table 3. Abstraction and interpretation of interview data based on the questions in Groups 1–3 in Table 2.

Identified relations between fashion design and character design for digital games

Field	Common dimensions			
	Potential connections	Potential barriers	Fashion designers can learn	Character designers for digital games can learn
Fashion design	Both industries sell ideas and fantasies	The fashion industry lacks knowledge about digital 3D technology	About alternative functions of clothes in digital game environments	To connect designs more to emergences in pop culture
Digital game development	Expressing identity through self-customisation	The body and dress are seen as equally designable and function as one object	How to translate aesthetic concepts into functioning three-dimensional assets	Greater diversity in terms of body types, genders, dress codes
At the periphery of either of the two	Similar software is used by both fields, allowing for shared processes	The two fields are siloed due to set structures that make it difficult to break with traditions	To bring value to digital clothes that goes beyond physical limitations	About the complexity of designing for identity expression

purposes and functions of garments. All groups expressed to see the main reason for the conceptual differences in what both disciplines consider to be design outcomes. Fashion designers primarily use three-dimensional CAD software to digitally construct and prototype garments on pre-defined digital bodies that they consider to be the final output of the digital design workflow. Additionally, digital fashion designers engage in animating and rendering their design outcomes afterwards to showcase their designs digitally as three-dimensional objects or high-resolution imagery. In contrast, the character designers for digital games described often starting by designing the body and dress together as one unified hybrid object, which they continue working on afterwards by rigging and animating the single elements of that hybrid object.

These differing perspectives suggested three factors that could further contribute to the conceptual differences between the disciplines: Firstly, designing garments for game engines requires different sets of design approaches as these engines have physics that require a different set of real-time interactive simulations, and as such require designers to regard body and dress as equally designable materials and objects. Secondly, garments in digital environments such as digital games primarily serve the purpose of individual expression, and as such do not require functional

considerations such as pockets, zippers, and openings. Thirdly, garments in digital environments such as digital games can have alternative functions, such as increasing a player character's attributes, being quest items to progress the story, or functioning as visual extensions for in-game narratives and themes. Additionally, they can serve as cosmetics that allow players to change the outfit or morphology of their avatar.

4.2. Relevance of hybrid design practices

Table 4 shows that all interviewees felt that there is a need for hybrid designers that can mediate between the two disciplines. This was discussed in relation to recent industry collaborations between fashion design and digital game design practitioners. Fashion designers and those at the periphery of both fields often stated that people in leading design positions in fashion possess limited understanding of digital technology, resulting in 'quick transactions' that regard collaborations more as marketing strategies than means to explore and acknowledge the potential of character design for game worlds.

All of the groups felt that smaller companies in both fields have the structural potential to engage in meaningful and explorative collaborations, but do not have the financial means. Contrastingly, larger companies have financial capital, yet are accustomed to set

Table 4. Abstraction and interpretation of interview data based on the questions in Group 4 in Table 2.

Identified characteristics for hybrid design practices

Field	Common dimensions			
	Role and purpose	Challenges	Requirements	State of the field
Fashion design	Helps both industries to adapt to the changes inherent in growing closer together	Company structures today still rely on specialists rather than hybrid practitioners	To be able to work with more technologies than CLO3D	A minority of fashion practitioners knows how to work with CLO3D
Digital game development	Provides an understanding of how to combine meaning-making of clothes with technical requirements	Technologies are not developed to work together smoothly	To understand the technical limitations that come with different game engines	Character designers work in a hybrid manner without background fashion knowledge
At the periphery of either of the two	Mediates between the two worlds for better communication	Focus on conceptual and technological possibilities that go beyond copying the physical into the digital	A good understanding of how both worlds function	Established fashion designers focus on old ways instead of opening up for hybridity

structures and roles. In this context, designers with hybrid design knowledge were seen as providing three benefits to both design disciplines: Firstly, they can mediate between specialists in each design discipline using shared terminology and experiences. Secondly, they can promote the conception and function of garments in both disciplines through informed consideration of the possibilities and limitations of digital workflows for the physical, and vice versa. Thirdly, they can support opening highly specialised professions by providing hybrid knowledge to smaller companies that cannot afford to hire teams of specialists from different professions.

4.3. Implications for higher education in fashion design

For fashion design to contribute to the emergence of trained hybrid designers that can mediate between fashion and digital games, higher education in fashion design needs to adapt not just to emerging digital technologies but also to practices, methods, and techniques from digital-native design disciplines, such as digital game design, which are informed by a different conception of the purposes and functions of garments (see Table 5). In this respect, higher education in fashion design needs well-trained lecturers with hybrid design backgrounds, who have experience of a variety of digital technologies in addition to software tailored for fashion design, as is the case with three-dimensional CAD software such as CLO3D and Browzwear. Their competences need to encompass digital technology that is used by multiple digital design disciplines in order to ensure a high degree of compatibility with other technologies and digital file formats, as well as to allow for designing beyond pre-defined end-uses of a particular design discipline.

In this respect, fashion designers and digital games designers stated that the same level of openness that is required of the technology used in higher education in fashion design is also required when designing digital garments, throughout the design process. Rather than teaching students how to create digital twins of garments or how to apply physical construction methods in the digital realm, students should be trained to explore and apply design possibilities for multiple outputs, both digital and physical. Hence, higher education in fashion design needs to regard digital assets as outputs for multiple contexts, such as digital games, platforms, and animation. As an extension of this, all of the interviewees agreed that an open mindset needs to be encouraged and accommodated in order to facilitate collaborations between fashion design practitioners and those in other disciplines.

Lastly, fashion designers and those at the periphery of both fields emphasised the benefits of teaching more general tools and application scenarios facilitated by digital technology, on the basis that the digitalisation of the fashion industry at this stage is not predictable in terms of which technologies may be successfully integrated in and remain relevant to fields in the long term. Hence, teaching a more open approach to digital technology and its potential applications may help future graduates of higher-education programmes to better adjust to changing trends in relation to the digitalisation of the fashion industry, which would not be possible were such programmes to rely exclusively on technological solutions that are tailored to specific audiences or practices within the field of fashion.

5. Discussion

The findings of the research presented in this article suggest strong connections between character design for digital games and fashion design, but that designing characters for digital games requires an understanding of and training in multiple software packages, game audience, and co-creation aspects, which are largely

Table 5. Abstraction and interpretation of interview data based on the questions in Group 5 in Table 2.

Identified requirements for a successful transition towards hybrid practices in higher education in fashion design

Field	Common dimensions			
	Software compatibility	Design outcome	General changes	Desired transition
Fashion design	Learn about software with shared archives	Understand digital clothes as ever-changeable, rather than as defined design outcomes	See digital three-dimensional technology as being as important as traditional tools and methods	Keep openness in digital education as the fashion industry is still transitioning
Digital game development	Learn about software compatibility for connected workflows	Learn how to create three-dimensional characters, not just clothes	Approach fashion in digital spaces beyond designing solely for the present	Teach students about physical techniques before digital techniques
At the periphery of either of the two	Learn about digital tools beyond those made for fashion	See equal value in digital and physical clothes	Fashion should not focus on technological limitations as it only leads to copying old ideas	Understand the most important aspects of designing garments in a physical context before entering the digital

absent in higher-education programmes in fashion design at present (Table 3).

Teaching digital technology such as CLO3D to students at a higher-education programme in fashion design likely means that they will be bound to that particular pieces of software when a variety of digital environments and software packages exist – or are in the process of being developed – and so need – or will need – to be understood (Table 5). Increasing students' digital skillsets and combining these with a foundation in conventional fashion design training would introduce students to multiple contexts and design outcomes, allowing them to contribute to the development of digital fashion in multiple digital environments.

The findings of this research support Sun and Zhao's (2018) and Varra's (2021) positing of a re-defined role for the fashion designer through the emergence of novel technologies. Similar perspectives are seen in the works of the Fashion Innovation Agency (2021), which aims to rewire existing practices through the implementation of digital technology that is not commonly employed in fashion design education. Further parallels can be drawn to Särmäkari and Vänskä's (2022) study, in which they suggest the emergence of a 'cyborg' designer who utilises tacit knowledge from physical practice within digital, algorithmic ones, fluidly bridging between competencies and professions. Implementation of tacit knowledge is also seen in the hybrid approach of Salomaa, wherein competence with a physical practice can benefit the digital design development and the knowledge of physical techniques together with a deep understanding of haptic and bodily experiences can improve the overall expression, complexity, and believability of characters in digital games (Makryniotis, 2018; Salomaa, 2021).

The research presented in this article suggests that, in order for future fashion designers to undertake professional hybrid practices, hybrid environments need to be established at higher-education fashion design institutions to allow students to increase their knowledge of methods and skills such that these incorporate digital tools and co-creation processes. This in turn will allow them to undertake expressive explorations and create representations of dress. These would be tested and applied not only to the field of fashion, but to animation and platforms such as social meeting spaces and games. In this context, higher education in fashion design could benefit from establishing a learning environment for digital tools that would facilitate the teaching of challenging concepts, methods, and techniques that are defined by fashion's physical heritage as much as they support it. It is within this realm that expressions and methods within fashion design practice can grow to not only

develop digital designs that mimic design outcomes in the physical world, but to have the potential to deliver rich digital experiences that explore the expressive possibilities that lie beyond the known.

Within such an academic environment, the competencies of educators need to encompass an open approach to digital technology that ensures that future fashion design graduates are prepared for changing trends that relate to the digitalisation of the fashion industry and able to pursue professional opportunities within both the field of fashion and neighbouring ones.

Despite the results, this study has been limited to the experiences and perspectives of a selection of practitioners. The interviewees with fashion design backgrounds had a good understanding and experience of digital technology as they have worked at the intersection of digital games and fashion design, while relatively few interviewees with a digital game background had profound knowledge of fashion design practices. Future studies could be based on the perspectives of a wider range of practitioners and explore the potentials and challenges of hybrid skillsets, and hybrid fashion designers' contributions to evolving digital environments.

6. Conclusion

With increasing interest in and demand for digital content and environments, higher education programmes in fashion design need to prepare and train students for artistic practices and methods within both physical and digital realms in order to provide them with opportunities to pursue digital fashion practices professionally. The findings of this study suggest that higher education in fashion design needs to better respond to technological and digital developments by adjusting to concepts of hybridity and avoid relying on software and tools that are tailored specifically to needs derived from physical design tradition. Instead, students would benefit from learning about digital software, tools, and methods that are shared by digital-native design disciplines as these facilitate shared and connected workflows.

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