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Recalibrating fashion education in light of emerging fashion-tech

Abstract

"The industry is quite old fashioned so to say, and with every step in the value chain there is an opportunity to leverage technology and digital to improve processes. So that's something we understand as Fashion-Tech, that we can use technology and digital in every step of our value chain from design to selling, B2B and end consumer, and make that more efficient and better and sustainable." (PVH, 29 June 2020)
"Covid-19 will completely re-shape and re-focus the Fashion and as consequence the Fashion-Tech market, curricula and employability profiles" – Eng.D. Enrico Cozzoni (PhD), (Grado Zero June 2020).
In light of COVID-19, devastating impacts to the fashion industry have forced businesses to accelerate, change and evaluate options to transform and respond to many challenges and difficulties. It is acknowledged that Fashion-Tech is operating in the context of a rapidly changing landscape for both the world, and fashion business and jobs. The integration between fashion and tech sectors has enabled a systemic shift in the fashion industry towards new business models, revenue streams, and improved sustainability and circularity. Fashion-tech when integrated across the full breadth of the supply chain leverages data is creating smarter and more sustainable products and services. In larger companies, fashion-tech incubators and start-ups are leading digital processes and upskilling, influencing and infiltrating within the business. The fashion designer having 3D design skills has become essential for current and future fashion-tech jobs. Finally, the focus on technical innovations for textiles and product development is directly linked to sustainable production and consumption. This paper is presenting the first outcomes of FTAlliance, an 3 year Erasmus + Knowledge exchange project based on academia-industries partnership (2020-2022) and aimed to facilitate the flow of knowledge and co-creation within the Fashion-Tech sector and universities to boost students' employability and innovation potential. The project consortium comprised twelve full partners and 1 associate partner from six countries: 5 fashion, design and engineering Higher Education Institutions (HEIs), 2 large fashion and apparel enterprises, 6 SMEs representing the Fashion-Tech ecosystem and the different supply chain segment and 1 Research Technology Organisation. Grappling with the concerns and global impact on the health, safety and vulnerability of employees and job stability, HEI partners worked in collaboration with industry partners to co-design different focus groups to discuss the future of Fashion-Tech. This paper shares research findings of these focus groups, outlining an integrated and embedded approach for interactions of HEIs with industry, guidelines on new pedagogical approaches and future job roles.

Keywords

Co-creation
Fashion-tech
Sustainability
Employability
Innovation

Introduction

For more than a decennium, an integration between fashion and tech sectors is taken place. The digitalisation of the fashion industry is enabling a systemic shift in the fashion industry towards new business models, revenue streams, improved sustainability and circularity, but it also has an impact on the job roles and company structures needed to make this transition successful. With Covid-19, this transition into new job roles and company structure has become even more urgent. 'The pandemic has occurred at a moment when manufacturing technologies are leapfrogging forward. Particularly when compared to other manufacturing industries, apparel production has a great deal of room to digitise and reap the benefits'. (Lund, S & Mekala, K 2021 p 81).

The aim of FTAlliance, an Erasmus + 3-year academia-industries partnership project (2020-2022)[1] was to further explore and build relationships and mutual understanding between HEIs and companies, to ensure the talent pool graduating from universities across Europe is equipped with the relevant high-level skills and profiles to respond to the current and emerging needs within the area of Fashion-Tech. The project is addressing to outline future directions of the industry and future job roles required. At the same time, it is exploring and defining guidelines on new educational approaches for HEIs course portfolios. Due to Covid-19 all mobility's and visits had to be modified into digital workshop and meetings executed in May 2020. This paper shares the first research outcomes from the three focus groups series dedicated to future job roles, educational guidelines and pedagogical approaches.

Focus group set up and aims

FTalliance is building on a previous project "Education-4Fashion-Tech: Interdisciplinary Curriculum for Fashion in the Digital Era" (E4FT) (2017-2020)[2] with a focus on interdisciplinary skills through both design, business and technology-driven innovation learning modules (E4FT.eu, 2018). One of the aims of the FTalliance project was to gather feedback from industry on this Edu4FashionTech curriculum and secondly to discuss and scope future directions of the fashion industry. What kind of new job roles in Fashion-Tech are required? How can we define skills of the future to generate an understanding of the role of Fashion-Tech in employability and future opportunities for graduates?

The three HEIs (UAL, HB and ESTIA) worked collaboratively with one industry partner(s) from the consortium to develop bespoke focus groups[3] – each exploring a different subject specific theme elevating Fashion-Tech strengths of the industry partner(s). By exploring different territories and directions in Fashion-Tech, the consortium tried to capture the breath of new developments in Fashion-Tech. UAL and PVH developed a focus group approaching Fashion-Tech from a large global classical fashion company integrating Fashion-Tech across the value chain for core business. HB and We Love You (+ plus multiple SME guests with a technological background) focused on Fashion-Tech for disruptive business models. Finally, ESTIA and Decathlon addressed Fashion-Tech for functional wear with a focus on core business and sustainability. Each focus group involved industry representatives from the consortium – inviting at least one of the three professional figures among design, HR, management departments.

Methodology: four step ontological approach

From the outset, a four-step ontological approach was agreed and used to capture data on: 1) current state of Fashion-Tech 2) future directions of Fashion-Tech 3) transitions required to achieve future directions in Fashion-Tech and 4) supporting Fashion-Tech roles and skills to assist transitions. The insights were used to start an informed discussion on the relevance of the E4FT MA Fashion-Tech curriculum in order to make any recommendations. Since each focus group addressed complementary perspectives on Fashion-Tech as described above, the rationale behind application of the 4-step ontological approach was to allow for flexibility of individual focus group design, while at the same time ensuring consistency in data collection and enabling better interpretation of results across all three focus groups. (table 1).

	FG1: UAL & PVH		FG 2: HB&NEUE			FG 3: ESTIA&DECATHLON	
4-STEPS APPROACH	**EP1**	**EP2**	**EP1**	**EP2**	**EP3**	**EP1**	**EP2**
Step 1. Current state of F-Tech	X		X				
Step 2. Future state of F-Tech	**X**	X	X			X	
Step 3. Transformations required		X		X			X
Step 4. Supporting roles and skills	X	X			X	X	X

Table 1- Application of a four-step ontological approach across the board of three focus groups.

The general approach for the focus groups was to define skills of the future. Secondly, to gain an understanding of the role of Fashion-Tech in employability and to have an understanding of the future opportunities this presents for graduates by exploring current and emergent future job roles. Finally, to link, test and gain feedback on the E4FT MA Fashion-Tech Curriculum with industry activities to develop an adequate, industry informed Fashion-Tech curriculum.

[1]FTalliance is aiming to facilitate the exchange, flow of knowledge and co-creation within the Fashion-Tech sector and universities to boost students' employability and innovation potential. The project consortium comprised twelve full partners and 1 associate partner from six countries: 5 fashion, design and engineering Higher Education institutions, 2 large fashion and apparel enterprise, 6 SMEs representing the Fashion-Tech ecosystem and the different supply chain segment and 1 Research Technology Organisation. https://fashiontechalliance.eu

[2]The University of Borås – Swedish School of Textiles, Politecnico di Milano – Dipartimento di Design (Polimi) and University of the Arts London – London College of Fashion formed a strategic partnership within the field of fashion-tech design in order to deliver a 'Fashion-Tech MA Curriculum'.

[3]Thoughtful considerations around the focus groups changing to take place in a digital environment resulted in the re-design of a 1 day workshop into a staggered and episodic approach. It was agreed that the focus groups would be split into two or three digital episodes, which would facilitate the four-step framework narrative to be delivered across consecutive weeks. The episodic approach permitted data to be analysed between episodes, therefore it enabled time to reflect, inform and personalise focus group content based on learnings and emergent findings. One benefit of moving the focus groups to a digital environment meant that it allowed easy access for all Fashion-tech Alliance consortium members to join the focus groups as observers, moderators and presenters.

The application of a 4-step approach was perceived as meaningful for establishing relevant and engaging context for discussion of Future Fashion-Tech roles and skills with participating industry partners. In particular, it allowed to understand how corporate objectives behind current and future engagement with Fashion-Tech should be aligned with the development and investments into digital talents to support the fashion-tech business transformation journey.
While generic guidelines and suggestions were provided for what each step should include, it was up to each individual HEI to adapt the methodology for their focus. The only requirement was to use 'skills radar' for identifying 'supporting roles and skills' in step 4 of the 4-step ontological approach.

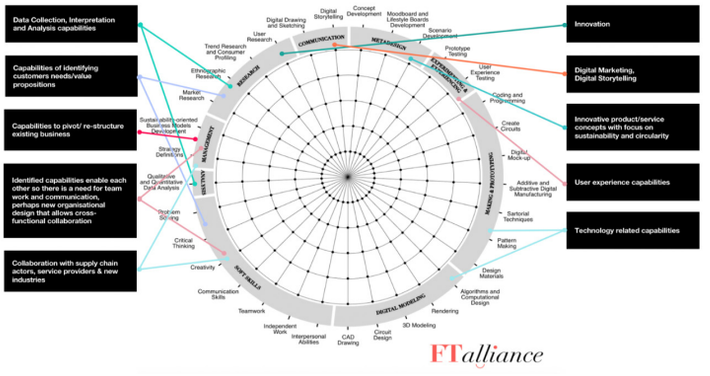

Figure 1 - Example of the Skills radar used to relate identified capabilities and to ideate skills requires to support Fashion-tech business model transformation.

The current state of Fashion Tech in companies

From the three focus groups with participants from industry and academia, the following conclusions can been made. The current landscape of Fashion-Tech shows an integration between fashion and tech sectors which is resulting in a systemic shift in the fashion industry towards three directions. On all levels, new business models are being introduced especially around revenue streams, and improved sustainability and circularity. Fashion-Tech when integrated across the full breadth of the supply chain leverages data to create smarter and more sustainable products and services.
In larger companies, Fashion-Tech incubators and start-ups are leading digital processes and upskilling, influencing and infiltrating within the normal business. The fashion designer having 3D design skills is considered a current and future Fashion-Tech requirement. Finally, there is an upcoming focus on technical innovations for textiles and product development such a biomaterials and/or a circular approach linked to sustainable production and more ethical and responsible consumption.

Future directions in Fashion-Tech

Future directions in Fashion-Tech highlight a more fundamental 3D transformation for B2C and B2B experience. For example, the entire digitising of the design and development process will enable new types of customer experience in the future using technologies such as holograms, AI and 3D printing. It also enables new design processes such as digital avatars, digital prototyping, programmable models and patterns and data/ AI enabled design. On the level of future revenue streams the three most promising areas identified for Fashion-Tech are the ones based on the potential for capturing value from sustainable and circular business practices such as: subscription-based revenue streams, new eco-system/ platform enabled revenue streams and revenue streams based on selling data.

Transformations required in Fashion-Tech

Finally, transformation required to achieve the future directions in Fashion-Tech was discussed especially in relation to future job roles. Collaboration & interdisciplinary skills were identified as important enablers for transformative change, creating links within flexible teams that are made of specialist and multi-disciplinary knowledge. Secondly, e-commerce was considered as a growth area within Fashion-Tech leapfrogging retail towards digital retail, which means that current roles may be lost and/or need to be repurposed in roles who have a 3D awareness to re-imagine buying space, visual merchandising & design. At the same time, e-commerce will be a driving new business models for new ecosystem/platform enabling 'mega-revenue' streams, including value capture based on selling data and subscriptions. These new directions are requiring job roles with skills such as data collection, interpretation and analysis, user experience. Lastly, the implementation of new technologies to transform the production process within the textile industry needs to integrate environmental & societal impacts. Therefore, sustainable knowledge is key.

New and emergent fashion-tech roles and skills/ 8 job families

From all focus groups, a list of more than fifty new and emergent skills and job roles were identified around eight job families. The first important roles addressed are roles with interdisciplinary skills that specifically act to create links within teams or bridges between roles. Interdisciplinary skills enable a collaborative approach of working across disciplines on a shared goal or objective. Agile approaches are highlighted as needed to enable interdisciplinary working within organisational structures such as cross-discipline temporary teams to solve specific task. Roles identified are Chief Technology Officer, Digital Product Manager, Innovation Manager, Creative Technologist, Digital Knowledge Manager, Transformation Specialist, Transformation Manager, Growth Lead, Engineer/ Designer and Job Teacher/ Facilitator.

Future roles in fashion design with 3D skills are considered essential, especially because they enable a better

interaction between other areas of the business. However, traditional fashion skills are still important with an increased need for material and textile knowledge especially in the area of sustainability ranging from an understanding of around zero waste pattern cutting towards working within circular teams to develop new business models. More specialised design roles required are: UX Designer, Colour Designer, Industrial Designer (modelling 3D), 3D Modelling Specialist, 3D Modelling Lead, 3D and Visualisation Expert, Virtual 3D Imaging (updated from photographer), Avatar/ Human Body Specialist, Fit Specialist, AI Designer, AR/VR Expert, Holographic Specialist, Digital Product Tester, 3D Pattern Maker, Pattern Programmer / Designer, Zero Waste Pattern Maker / Designer.

Over the next years, Omnichannel and E-commerce will only accelerate resulting in an increasing importance of digital storytelling within the customer experience of the digital product. Developments in avatar and digital body fitting will enable a personalised e-commerce experience. As a result, the role of the user experience designer and related roles will also become more important. Some concrete new roles mentioned are Expert in 3D E-commerce/ Digital Experience, User Experience Designer, Digital Experience Manager, Customer Experience Designer, Customer Success Managers, Vendor Integration Specialist, Co-creation Platform Manager, Personal Tailor/ Virtual Seller.

A strong focus on technical innovations, digital innovations for textiles and product development, to support advanced sustainable production and consumption was identified. More and more there is an understanding that adapting Fashion-Tech on all levels can contribute to sustainable and circular solutions. Therefore, the following sustainable skills and roles are foreseen: Circular Design Pattern Expert, Chemical Designer (scientists), Chemical Engineer, Green Fabric Sourcer, Fabric Component Designer, Material Researcher, Material Innovation Manager / Ecosystem Innovation Manager of Components, Eco-fabrics Designer. With the growth of incubator & start-up programmes, sometimes operating within a big company, entrepreneurial and innovation management, skills and roles are needed, such as leading with a visionary approach, pitching and developing nuanced ideas. Meta-design extends beyond traditional research and product development skills to include systems thinking skills. Roles within product design could evolve to become system designer roles such as Digital Product Manager, Systems designer, Innovation Manager (working with product development teams).

Data analysis and management & governance skills and roles is another area that is becoming increasing important. Some emergent Fashion-Tech roles would require knowledge in digital law related to data security, regulations and data protection. Data analyst's roles also need to understand insights specifically related to Fashion & Fashion-Tech. Specific opportunities will start for data analysts working directly with AI experts and software developers to produce zero waste patterns for products based on user data. Concrete roles are Data Scientist (process automation, product creation), Data Analyst, Artificial Intelligence Expert, Software Developer.
Policymaking roles, such as Lobbyist and Policy Influencer, was highlighted as an important area. Policy experts at governmental, national and corporate levels will become key in shaping policies that facilitate business model innovation and collaboration between industry partners and between different teams within organisations. Finally, there is future potential for micro-manufacturing and local supply chains, resulting in new manufacturing skills and roles. Micro-manufacturing using 3D printing technologies would improve internal production processes. Micro-manufacturing skills and roles, such as Micro Factory Manager, Head of Technology (Engineering) and 3D Printing Specialist, link to sustainability and supply chain management. .

Designing and piloting educational learning experiences based on E4FT Curriculum

The last task of the focus groups was to map and validate the E4FT MA Fashion-Tech curriculum[4] (Colombi and Teunissen, 2020) establishing an education and research programme in this continuous transforming field, aimed to increase interdisciplinary skills through both design, business and technology-driven innovation learning modules. The most crucial recommendation from the industry partners in the consortium was to enable navigation and selection of the learning units to enhance the learning flexibility, from multidisciplinary to interdisciplinary learning. In addition, interaction and engagement, a common glossary definition, direct companies' involvement, real-world challenges, personalized learning, and openness in structure were recommended. Based on this feedback, POLIMI developed and proposed in collaboration with the partners a blended curriculum where this Fashion-Tech industry perspective was integrated into the MA curriculum E4FT[5]. This new integrated educational model will be tested through 3 pilot learning experiences[6] within the FTalliance project duration. The first one was designed and tested early 2021[7]

[4]The E4FT Fashion-Tech Curriculum, was developed as a two-year MA Fashion-Tech Design program with a modular and flexible structure. Divided into 3 Educational Sections of Focus (Design and Multimedia communication, Technology and Engineering and Human Social, Psychological and Economic context) and consisting of 18 units in total, the MA program offered the option of levelled education for learners with a different background in education and experience. More information via this link: https://www.e4ft.eu/

[5]The integrated Fashion-tech Curriculum model is fully described in the D1.1 of the Fashion-Tech Allliance project available an fully downloadable at this link: https://fashiontechalliance.eu/images/reports-and-publications/D11_Integrated_industry_relevant_Fashion-Tech_Curriculum_Model_V3.pdf

[6]The learning experiences are conceived as cross-universities, international and interdisciplinary courses held digitally with a flexible timing and modular credits attribution, accounting for different academic calendars and structures. The asynchronous modules are delivered at the beginning of the course to share theoretical pillars as multisciplinary contents for common showledge and will last from 2 to 3 weeks, meanwhile the synchronous challenge-based part will last from 6 to 8 weeks. Accordingly, the course will deliver from a minimum of 6 ECTS to a maximum of 7.5 ECTS, depending on each University.

[7]First released Learning experience "FTInterline: The virtual dimension of fashion design took place from 6th of January 2021 to 8 of March 2021. Structure, syllabus and results can be accessed via the link: https://fashiontechalliance.eu/en/the-project/main-goals

and the second and third will be delivered in the autumn of 2021. The three courses are designed according to the following principles:
(i) They will include an industry perspective both in the definition and in the development of the courses.
(ii) They will take a digital educational approach through both traditional (e.g., students learning from teaching staff) and non-traditional interactions (e.g., student learning from professionals).
(iii) They will select and prioritis subject-specific pedagogical techniques adequate for the Fashion-Tech areas to be used across a variety of learning environments.

The three courses are following the E4FT multi-disciplinary and interdisciplinary approach in learning and teamwork, but are delivered via a double learning experience. The course kicks off with a theoretical part focusing on content, knowledge, and information in emergent subject areas of Fashion-Tech (e.g., concepts, theories, principles, methodologies, methods, and tools). This is followed up by a challenge-based Learning-by-doing part, where students from different disciplines approach the challenge via similar goals, whilst at the same time explore and analysethe topic from their own subject specialism and discipline. As a result, there is more "integration and modification of the disciplinary contribution" (Stember, 1991) as well as more negotiations across the various disciplinary perspectives (Choi & Pak, 2006). The learning experiences deliver content and lectures across different disciplines and subject-areas, such as design, engineering, and business management and are released as Open Educational Resources (OERs)[8] (Miao, Mishra and McGreal, 2016). In addition, company expertise, knowledge, and competencies comes into curriculum through the real-world challenge briefs and through teaching and coaching activities from teaching staff and professionals. Finally, the course structure, designed with a high level of flexibility, enables personalized learning experiences tailored to the students' specific needs and background. An atypical calendar structure supports students with different backgrounds to participate, whilst content was kept adaptable to stay on top of a constantly changing Fashion-Tech sector. Based on the feedback, FTalliance developed this Fashion-Tech learning experience with a bespoke approach to accommodate individual pathways for students with different knowledge and skillsets to meet the industry requirements. As a result, students are learning general soft-skills (e.g., communication, teamwork and interpersonal abilities, creativity and cooperation, serendipity, and an open and innovative mindset) as well as wide variety of Fashion-Tech Subject-specific skills. (see figure 2).

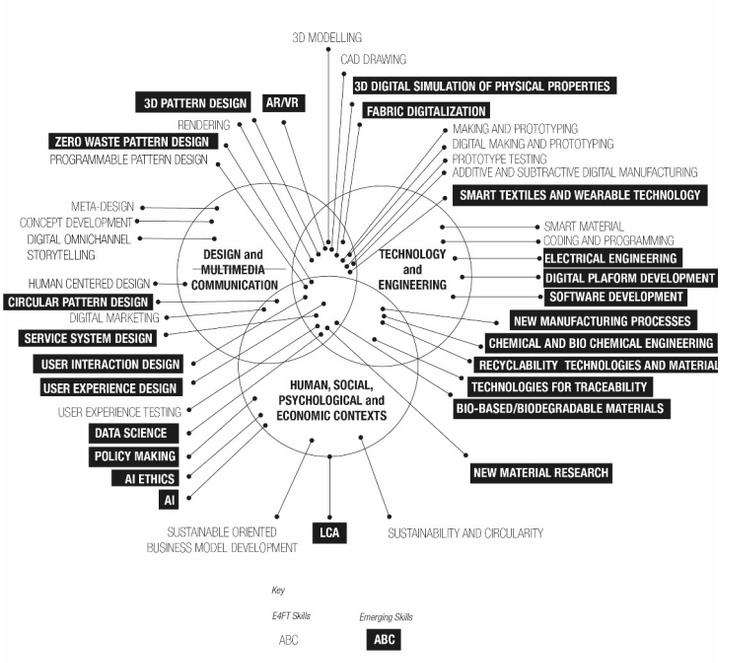

Figure 2 - Overview of the Subject-specific Skills as resulting from the three focus groups integrated into the three pilot courses

Pedagogical models and educational approaches to support innovative learning experience for future Fashion-Tech talents

In addition, desk research was executed into specific innovative pedagogical models that could provide a solid methodology for the new Fashion-Tech educational model. Challenge-based learning (CBL), Flipped Classroom (FC), and Social Learning (SL) were selected as the most relevant models to enrich and enhance the Fashion-Tech learning[9].
The first one, CBL is an engaging collaborative educational approach encouraging students' learning through discovering and solving real-world challenges. Students are collaborating with all involved stakeholders (students, teachers, and industry experts) during the learning journey engaging with challenges via critical questioning, proposing evidence-based solutions, and documenting, sharing and reflecting on the experience (Nichols and Cator, 2009; Nichols et al., 2016). The active engagement followed by reflection empowers students in applying theoretical knowledge into practical situations and problem-solving contexts in the classroom and, later on, in the professional world (David, 2008). CBL methodology is comparable with Project-Based Learning (PBL) (Gallagher, 1997) and Design Thinking (Brown, 2008) approaches, but the benefit of the

[8]A selection among the materials used for the first course was released in the shape of OERs. They include teaching, learning, and research materials in a digital video format focusing on presenting fashion-tech trends, methodological approaches to design next and far future scenarios, methodological approaches to assess and evaluate user experiences of fashion-tech garments/accessories, technical lectures related to digital transformation and sustainability impact, business oriented lectures related to new fashion-tech business and revenue streams models. OERs have been shared in the public domain under an open license that permits no-cost access, use, adaptation, and redistribution by others with no or limited restrictions via the FTalliance website platform (https://fashiontechalliance.eu/en/open-resources/videos) and FTalliance Youtube channel (https://www.youtube.com/channel/UC5tPyM41mff3qX3CpWwWfMg/videos) to guarantee the widest reach toward interested stakeholders in the Fashion-tech sector.

[9]The educational model/format specifically applicable to Fashion-Tech education is presented in the D2.1 Project Based Learning Modules https://fashiontechalliance.eu/images/reports-and-publications/D2_1_Project_based_Learning_Modules.pdf
The main features of the developed format/educational model are learning flexibility, from multidisciplinary to interdisciplinary learning, interaction and engagement, common glossary definition, companies' involvement, real-world challenges, personalized learning, and openness.

CBL pedagogical approach is that students develop a more profound, in depth subject-specific knowledge whilst at the same time, boosting soft, replicable skills, and improving students' attitudes towards learning.

Using this CBL pedagogical model, the three FTalliance's courses learning experiences will be able to incorporate real-world issues, defined in collaboration with the Fashion-Tech partner companies. Being set up as challenges, the courses are aiming to boost creative encounters and reciprocal exchanges among all the participants (students, teachers, experts from companies). Starting with a problem-based brief, students are invited to explore, investigate and analyse the complexities, interconnections, and ambiguities of the problem set. By merging different approaches in analysing and processing information such as researching, interviewing, planning out the process, managing time, organizing their work, thinking creatively, collaborating with other students, speaking and pitching, producing proof of concept and multimedia presentations, whilst also taking the initiative, students will develop a wide variety of applied skills. This integrated and interdisciplinary approach of CBL offers students an understanding on how to make connections across different subjects, whilst the teaching staff – in a coaching and mentoring role - provided guidance during the whole course.
Flipped Classroom (FC) was chosen as the second educational methodology for Fashion-Tech learning. FC introduces the subject area and the content before the actual classes start. The live sessions in the classroom are used for questions and answers, exercises, creative assignments with guidance of the teachers to apply the knowledge that is previously acquired. The result is a dynamic, interactive learning environment that improves deep and long-term learning. (Mazur, 2009; Berrett, 2012). The FC approach has been used especially for the theoretical learning part of the 3 courses to enhance the reflective and creative learning part and to boost interaction among students. According to Bloom's taxonomy, FC will enable students to (Bloom et al., 1956):
remember, understand: OERs and various learning support for basics content knowledge will be provided to students to be consulted before class (e.g., watching a video, answering questions, completing a reading assignment);
analyse, evaluate, create: before class, specific exercises are proposed to apply key concepts to be carried by students interacting among peers;
analyse, evaluate: during the CBL part, knowledge consolidation and evaluation happens through interactions with teaching staff.
Finally, Social Learning Theory (SL) (Albert Bandura, 1997) emphasizing that human behaviours are influenced by continuous reciprocal cognitive, behavioural, and environmental interactions, fits the Fashion-Tech learning experiences. SL is leveraging peer learning, interaction, and engagement among learner-teacher, learner-learner, and learner-content to ensure a connected student experience (Moore, 1989), to reach educational goals, and learn from the colleagues' experiences and challenges. Interaction is central to student engagement conceived as "the amount of physical and psychological energy that the student devotes to the academic experience" (Tinto, 2006; Astin, 1984). Many studies state that engagement results in student success, improved learning and achievement (Kahn, 2014; Zepke, 2014, Hoskins, 2012; Sinatra, Heddy, & Lombardi, 2015) and is especially helpful for distant and online educational contexts where dropout is a problem. In the FTAlliance learning experiences, the three methodologies (CBL, FC, SL) were endorsed with several digital tools, such as discussion forums, chats, digital classrooms, collaborative digital boards. The discussion forum is an essential tool to share and discuss assignments, exercises, and reflections among all participants (students, teachers, experts from companies), showing work and giving/receiving feedback. Collaborative digital boards (e.g. Miro, Mural, Conceptboard, Ziteboard, Whiteboard fox, Stormboard) allow students' to co-create a shared and meaningful body of knowledge, to interact and to brainstorm, and to creatively co-design a product/service/system. These visual digital whiteboards are helpful as project management tools as well to control the workflow of activities, to map and visualize ideas in early creative stages, and as co-design tools, allowing groups to modify output and edit in real-time or asynchronously and to facilitate consensus buildings.
The integration of the three FL, SL, CBL pedagogical approaches into the courses, resulted in learning output that do not focus on well finished Fashion-Tech end results but on proof of concepts and solutions with an emphasis on the process: problematizing, reframing, and iterating in design, engineering, and business management domains (Cross, 2010).

Conclusion

The first outcomes of the FTalliance project (2020-2023) have generated a rich insight in future Fashion-Tech job roles and skills needed for future Fashion-Tech talent. The emerging landscape of job roles and subject-specific skills is wider and more entangled then generally understood. The project piloted the first of the three learning experiences, testing the integrated E4FT Fashion-Tech Curriculum across 5 HEIs built around the following key guidelines: learning flexibility, from multidisciplinary to interdisciplinary learning, interaction and engagement, common glossary definition, companies' involvement, real-world challenges, personalized learning, and openness. The first learning experience pilot was an excellent testbed to challenge and explore HEIs different backgrounds and disciplinary perspectives into a convergent and aligned educational approach. It confronted European HEIs with a lack of consistency in framework, delivery models, workload and timeliness. Knowledge exchange between industry and universities fostered the three courses with a direct commitment and contribution from industry as well as with integrated industry challenges into the courses. It raised awareness for the emerging Fashion-Tech professional opportunities and invited fashion design students to integrate new technologies into designs, whilst engineering students were able to explore the fashion industry. Finally, it offered students an opportunity to access a rich, multidisciplinary curriculum aligned to the latest market requirements as well as an in depth understanding of the Fashion Tech market and industry needs.

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