



Digital Fashion Project

Collaborative Online International Learning in Digital Fashion

Short report on the digital skills needed in the fashion industry and on the learning requirements of disadvantaged groups

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein. Project N° 2021-1-RO01-KA220-HED-000031150



**Co-funded by
the European Union**

Short report on the digital skills needed in the fashion industry and on the learning requirements of disadvantaged groups

Project Coordinator: The National Research-Development Institute for Textiles and Leather –INCDTP Bucharest

Report Coordination: University of Maribor

Authors:

Andreja Rudolf
Tadeja Penko
Zoran Stjepanovič
Ion Razvan Radulescu
Catalin Grosu
Razvan Scarlat
Emilia Visileanu
Irina Ionescu
Manuela Avadanei
Alexandra Cardoso
Tânia Espírito Santo
Joris Cools
Sheilla Odhiambo
Cosmin Copot
Alexandra De Raeve
Xianyi Zeng
Sébastien Thomassey
Xuyuan Tao

November 2022



Content

1	INTRODUCTION	4
2	SHORT REPORT ON THE CLOTHING AND FASHION EUROPEAN COMPANIES SURVEY	5
2.1	GENERAL INFORMATION REGARDING SURVEYED COMPANIES	5
2.2	THE EXPERIENCE OF EUROPEAN COMPANIES SURVEYED WITH VIRTUAL FASHION TECHNOLOGIES	7
2.3	REQUIRED DIGITAL SKILLS FOR VIRTUAL FASHION TECHNOLOGIES AND NEEDED JOB PROFILES	11
2.4	CONCLUSIONS	14
3	SHORT REPORT ON THE INTERVIEW WITH A FOCUS GROUP OF FASHION AND TEXTILE COMPANIES	16
3.1	BASIC INFORMATION ABOUT THE INTERVIEWED EUROPEAN COMPANIES	17
3.2	SOFTWARE FOR GARMENT CONSTRUCTION	18
3.3	SOFTWARE FOR VIRTUAL 3D PROTOTYPING OF CLOTHING	18
3.4	OTHER TYPES OF SOFTWARE TOOLS	19
3.5	CONCLUSIONS	20
4	SHORT REPORT ON THE LEARNING REQUIREMENTS OF DISADVANTAGED GROUPS	21
4.1	DISADVANTAGED GROUPS	22
4.1.1	<i>Access issues for people with disabilities</i>	23
4.2	ANALYSIS ON LEARNING REQUIREMENTS OF DISADVANTAGED GROUPS OF EUROPEAN PROJECT PARTNERS	24
4.3	CONCLUSIONS	26
5	CONCLUSIONS	27



1 INTRODUCTION

This short report on digital skills needed in the fashion industry and on the learning needs of disadvantaged groups provides the main findings of the first project result (PR1) based on the activities carried out, which are summarised in joint reports:

- Joint report on the clothing and fashion companies survey,
- Joint report on the interview with a focus group of fashion and textile companies, and
- Joint report on the learning requirements of disadvantaged groups,

and holistically providing the methodology for collaborative international online digital fashion learning.

The joint report on the survey of fashion and clothing companies and joint report on the interview with a focus group of fashion and clothing companies provide current digital skills needs for the fashion and clothing companies and the state of industrial application of virtual fashion technologies in five European partner countries: Romania, Portugal, Slovenia, Belgium, and France.

The joint report on the learning needs of disadvantaged groups in European partner countries provides guidelines for the required teaching methods for collaborative international online learning in the field of digital fashion.



2 SHORT REPORT ON THE CLOTHING AND FASHION EUROPEAN COMPANIES SURVEY

This report on clothing and fashion companies aims to assess the level of key digital fashion skills, industrial application and needs, and to develop a methodology for collaborative international online digital fashion learning in five partner countries: Romania, Portugal, Slovenia, Belgium, and France.

The survey was conducted among 35 European fashion or clothing companies using the online tool Google Forms in all partner countries (at least five companies per partner). The short report consists of a survey analysis of all European fashion and clothing companies surveyed. In Romania the survey was conducted with eleven fashion and clothing companies, in Belgium with eight, in Portugal with six, while in Slovenia and France the survey was conducted with five fashion and clothing companies.

The questionnaire was divided into three groups: (1) company data and respondent profile information, (2) company experience with virtual fashion technologies and (3) digital skills required for virtual fashion technologies and needed job profiles. The questionnaire was answered anonymously and contained different types of questions, such as dichotomous, multiple choice and open questions, in order to obtain the best possible opinions. The survey was analysed using descriptive statistics as the main purpose of the questionnaire was to identify a clear need for digital skills for the fashion industry and the industrial application of virtual fashion technologies in Europe.

2.1 General information regarding surveyed companies

On the European level 43 % of the surveyed companies produce fashion clothing, 17 % protective workwear clothing, 11 % women's outerwear, 11 % underwear, 6 % men's outerwear, 6 % sportswear, 3 % children's outerwear and 3 % knitwear.

37 % of the surveyed European companies are larger companies with more than 249 employees. 14 % of companies have 50 to 249 employees, 29 % of companies have 10 to 49 employees and 20 % of companies have 1 to 9 employees.



40 % of companies export 75 % or more of their products, 11 % of companies export less than 25 % of their products, 6 % of companies export 50 to 74 % of their products, 17 % of companies export 25 to 49 %, and 26 % of companies do not export their products.

The turnover of the European companies surveyed is: 15 % of the companies have an annual turnover of more than 100 million euros, 29 % of the companies have an annual turnover between 10 and 50 million euros, 6 % between 50 and 100 million euros and 21 % of the companies have an annual turnover between 1 and 10 million euros, and 29 % of the companies have an annual turnover of less than 1 million euros.

In the first part of the questionnaire, the surveyed companies also defined their attitude towards innovation. The majority of companies evaluate innovation from the perspective of products, technologies, design and research as high innovation, while IT and distribution are mostly evaluated as medium innovation, Figure 2.1.

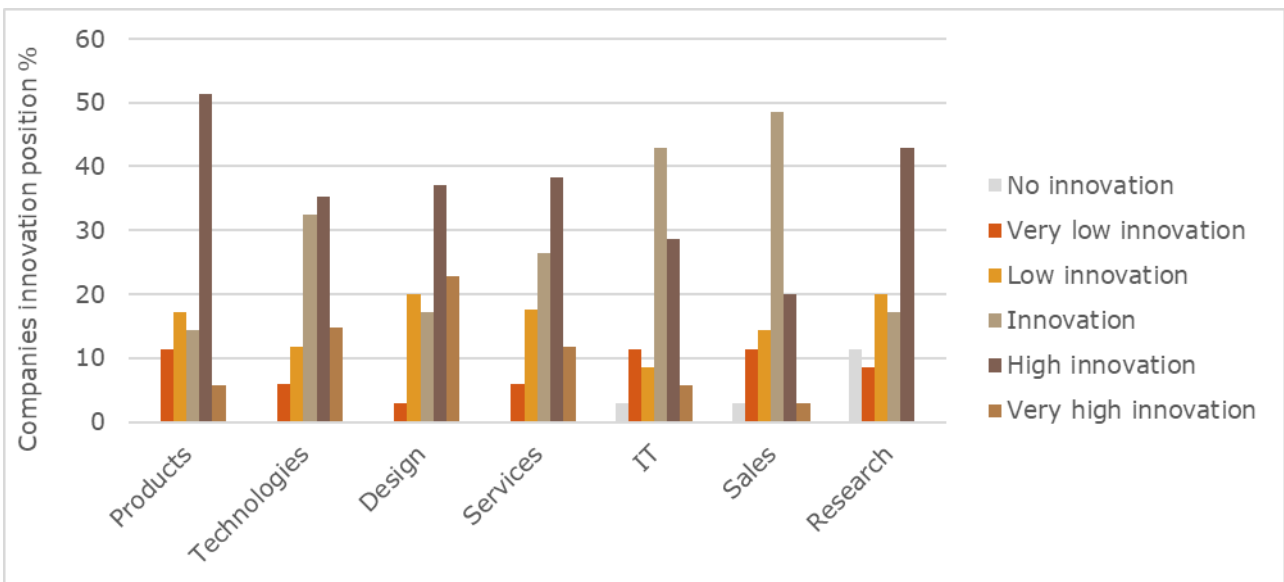


Figure 2.1: Innovation position of the European companies surveyed

13 % of European companies spend more than 15 % of their share on promoting activities, while 19 % spend about 10 % to 15 %, 31 % spend about 0 % to 5 %, and 37 % of companies spend about 5 % to 10 % of their share for this purpose.

In addition, all European companies surveyed have a high innovation strategy, Figure 2.2. For 64 % of the companies, it is very important to increase market share (29 % rank increasing market share as the highest importance and 35 % as high importance). Increasing profit is very important for 58 % of the companies (29 % rated increasing



profit as highest importance and 29 % as high importance). Introducing new products into the production process is very important for 55 % of the companies (26 % rated this as highest importance and 29 % as high importance). Increasing production capacity is very important for 54 % of the companies (17 % rated it as highest importance and 37 % as high importance).

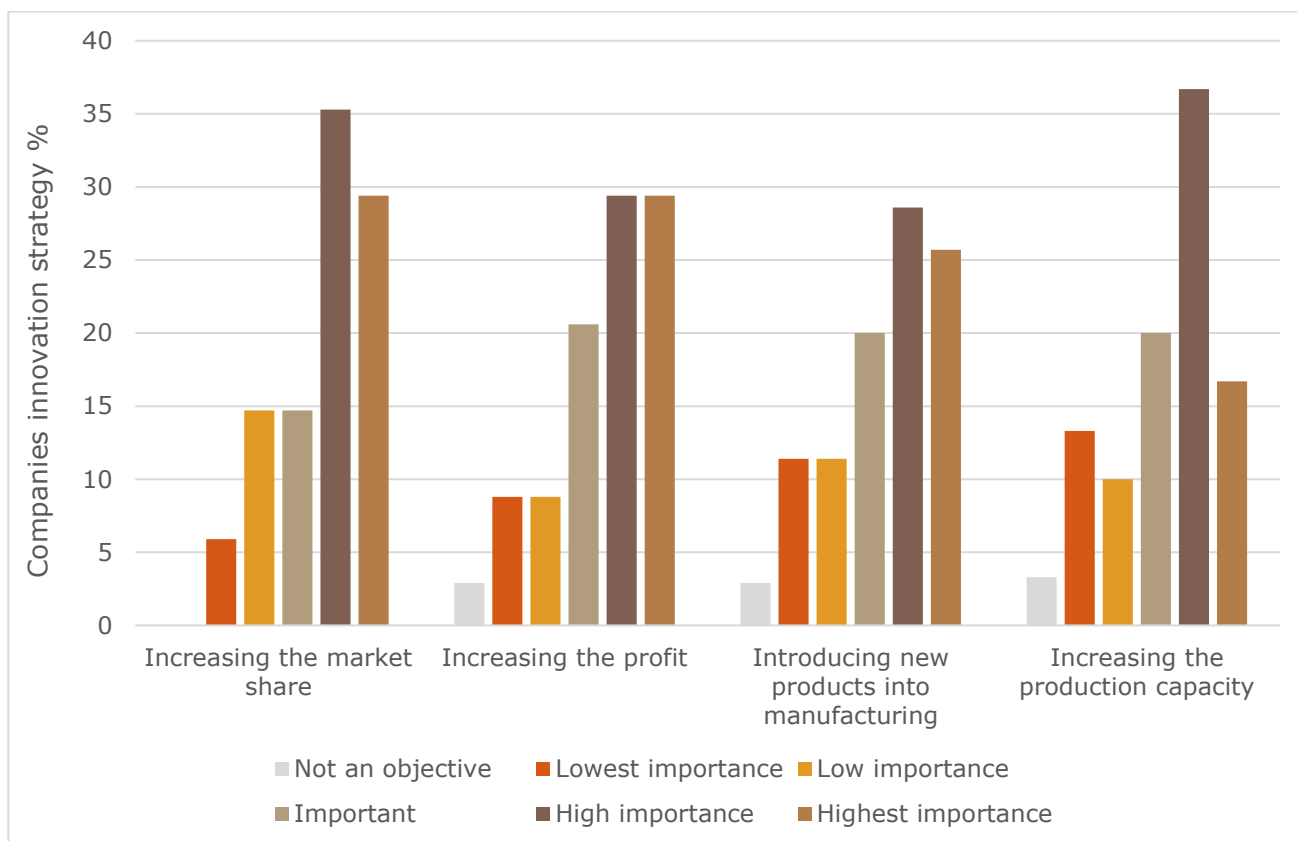


Figure 2.2: Innovation strategy of the European companies surveyed

2.2 The experience of European companies surveyed with virtual fashion technologies

The questions in the second part of the survey related to companies' experiences with virtual fashion technologies. Indeed, digital practises in fashion and clothing companies are gaining more and more attention. Together with virtual fashion technologies for virtual 3D prototyping and visualisation, this enables the digitalisation of the entire creative process of clothing production, its presentation and its offer.



The survey found that 71 % of European companies have no experience with virtual fashion technologies, Figure 2.3. Of those companies that do not have experience, 65 % of companies intend to introduce virtual fashion technology, 13 % of companies have no intention of introducing it, and 22% of companies do not yet know whether they will introduce virtual prototyping technologies, Figure 2.4. The European companies that have experience with virtual fashion technologies also have varying lengths of experience with these technologies. 25 % have experience from 1 to 3 years, 25 % from 4 to 5 years, 17 % from 6 to 10 years, 11 % from 11 to 20 years and 8 % less than 1 year, Figure 2.5.

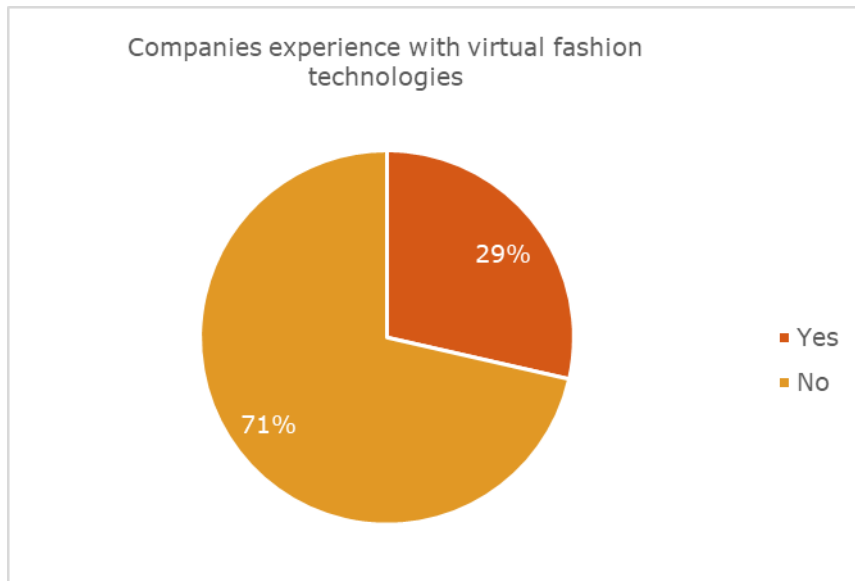


Figure 2.3: European companies experience regarding virtual fashion technologies

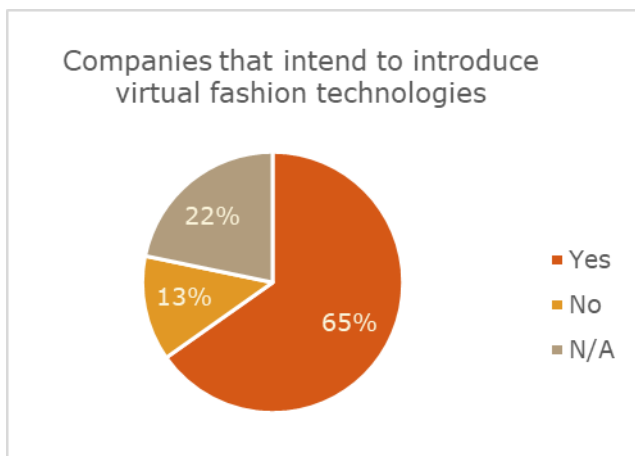


Figure 2.4: European companies intend to introduce virtual fashion technologies

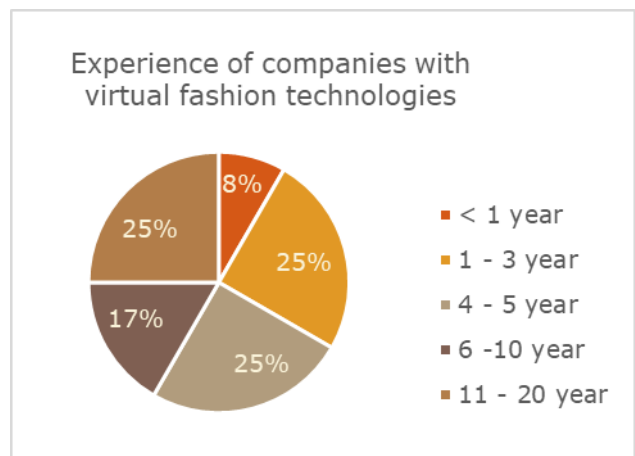


Figure 2.5: The experience of European to companies regarding virtual fashion technologies



31 % of companies use software for fashion drawing and illustration, 29 % of companies use specialised software for technical drawing, 24 % of companies use software for designing garment patterns on the computer and 16 % of companies use software for virtual prototyping, garment fitting, and visualising garments, Figure 2.6.

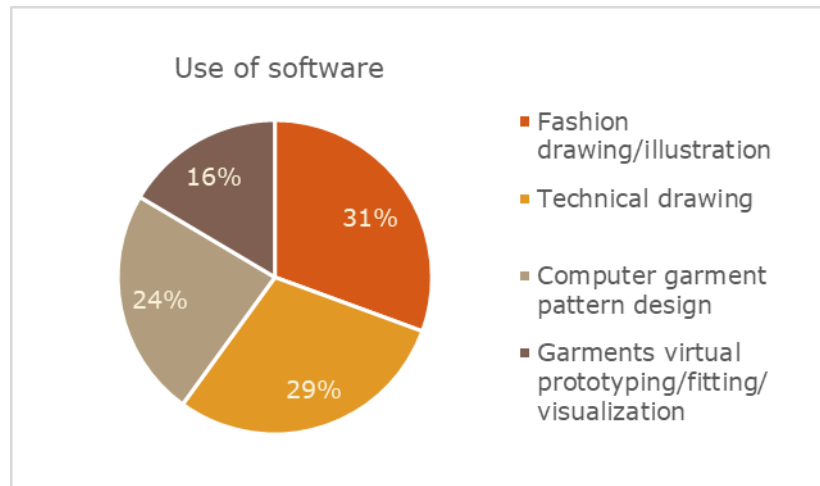


Figure 2.6: Use of software in the European companies surveyed

The most commonly used software for drawing and illustrating fashion is Adobe Illustrator (33 %), followed by Adobe Photoshop (24 %) and Corel Draw (14 %). Companies also use Corel Photo-Paint (4 %), Kaledo (6 %) and 3D Design for Illustrator (10 %). 9 % of companies use other software for pattern design such as GRAPH6+, Procreate, Clo and Clo3D, Figure 2.7.

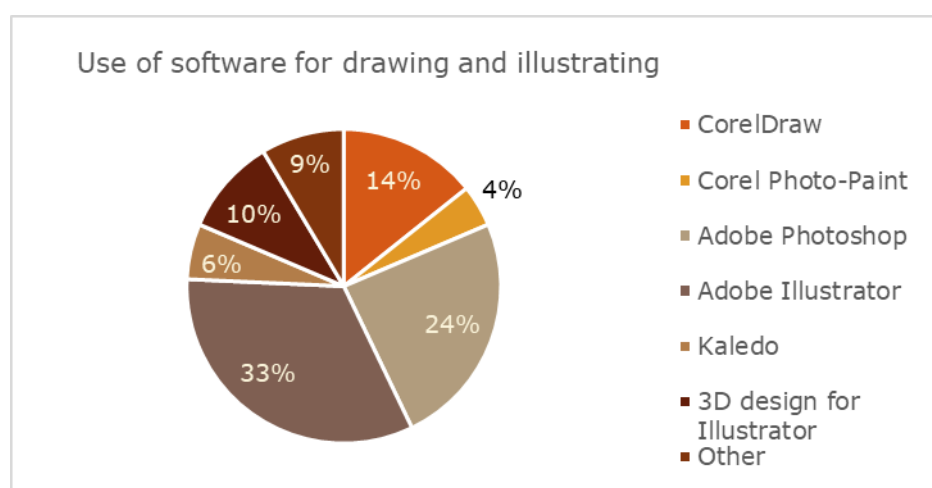


Figure 2.7: Use of software for drawing and illustrating in the European companies surveyed



For technical drawing, companies use Adobe Photoshop (25 %), Adobe Illustrator (21 %), CorelDraw (20 %), 3D Design for Illustrator (12 %), Corel Photo-Paint (5 %) and Kaledo (5 %). 12 % of companies use other software for pattern design such as GRAPH6+, Lectra and Solidworks, Figure 2.8.

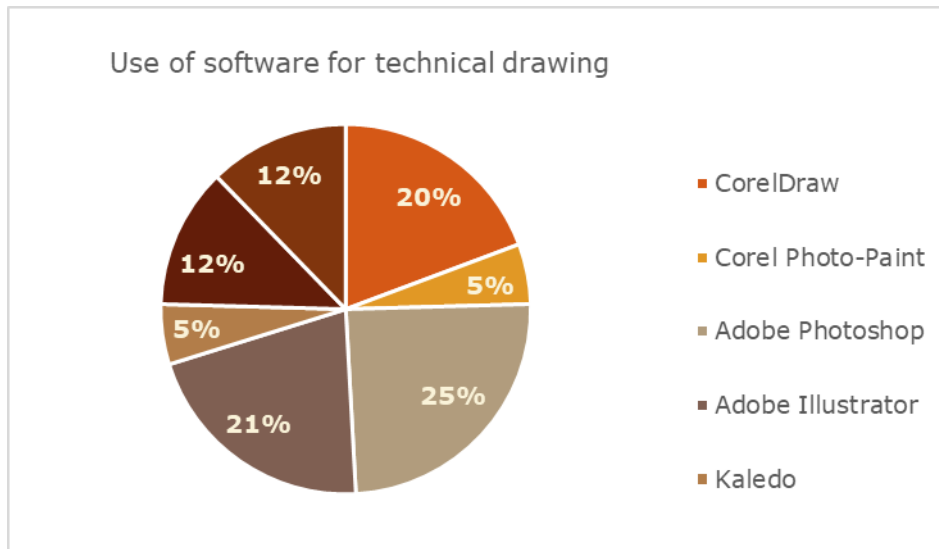


Figure 2.8: Use of software for technical drawing in the European companies surveyed

European companies use Lectra (28 %), Gerber (22 %), Gemini (19 %), Assyst (5 %), Clo (6 %) and Browzwear (6 %) software to design 2D garment patterns on the computer. 14 % of the companies use other software to design patterns: Apex3, Shima Seiki, Photoshop, Illustrator and Gerber AccuMark, Figure 2.9.

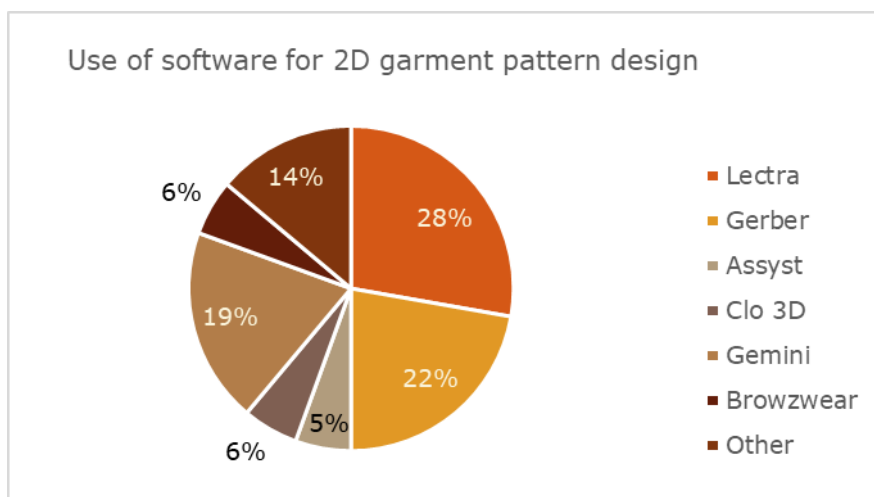


Figure 2.9: Use of software for 2D garment pattern design in the European companies surveyed



For virtual 3D prototyping, fitting and visualisation of garments, companies use Clo3D (42 %), Lectra/Modaris (19 %), Browzwear/VStitcher (8 %), Gerber/AccuMark (11 %), Gemini (8 %) and Optitex 3D (4 %), Figure 2.10.

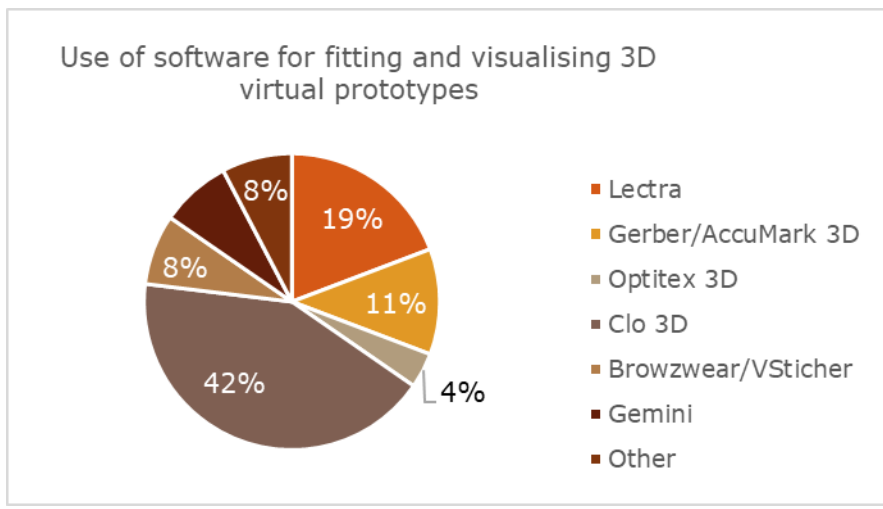


Figure 2.10: Use of software for fitting and visualising 3D virtual prototypes in the European companies surveyed

2.3 Required digital skills for virtual fashion technologies and needed job profiles

The level of digital and other skills of corporate employees varies according to purpose, Figure 2.11. 14 % of the European companies rated fashion drawing and illustration skills as high, 66 % as medium, 14 % as low and 6 % as not available at all. 36 % of the companies rated technical drawing skills as high, 44 % as medium, 17 % as low and 3 % as no skills in this area. 42 % of the companies rated skills in computer design of garments as high, 39 % as medium, 9 % as low and 9 % as no skills at all. 21 % of companies rated skills in virtual prototyping, fitting, and visualisation as high, 32 % as medium, 24 % as low and 24 % as not available at all. 41 % of the companies rate the knowledge of human body anatomy and body measurements as high, 56 % as medium and 3 % as no knowledge. The knowledge of textile materials is for 60 % of the companies high, for 37 % medium and for 3 % low. For knowledge of garments sewing, the result is: 60 % have high knowledge in this area, 37 % of the companies have medium knowledge and 3 % have no knowledge.



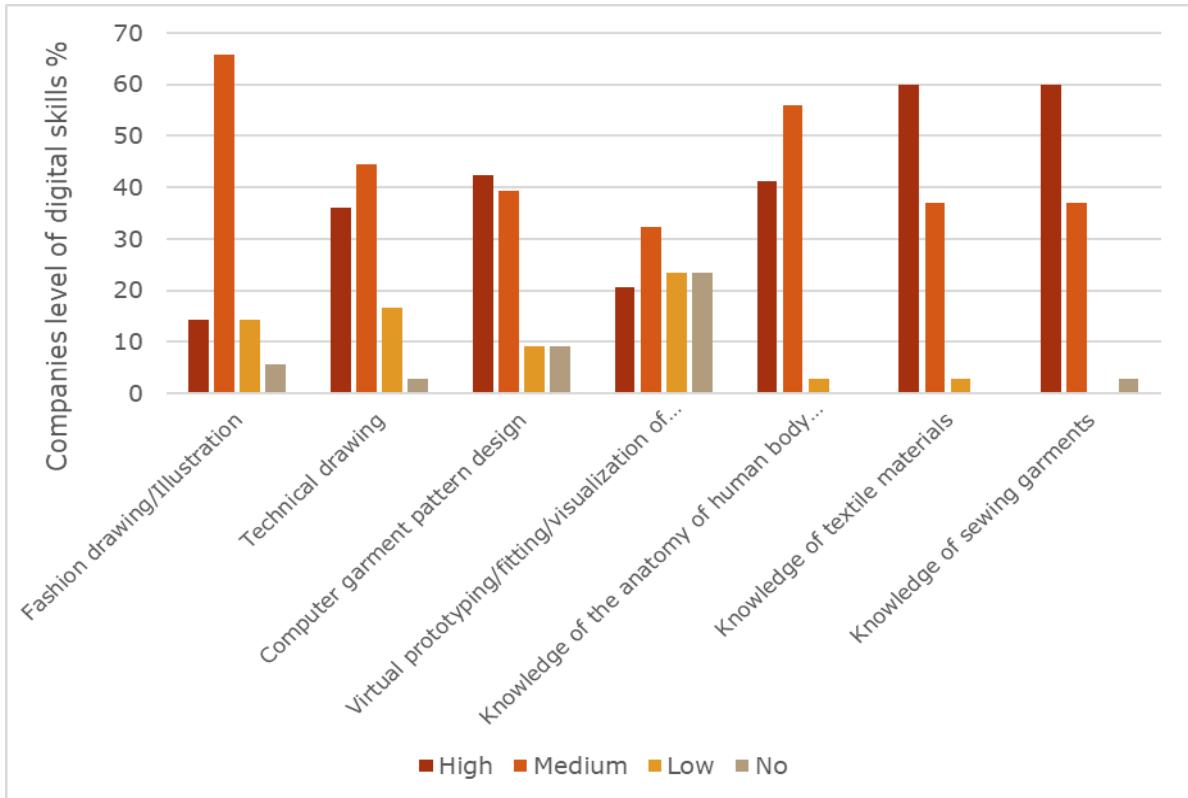


Figure 2.11: Level of digital skills for virtual fashion technologies in the European companies surveyed

In the European companies surveyed, 74 % of the companies have fashion designers, 71 % technical designers, 80 % computer pattern designers (2D CAD designers) and 28 % have 3D designers. In most companies, 3D designer is the most needed profession (72 %), Figure 2.12.

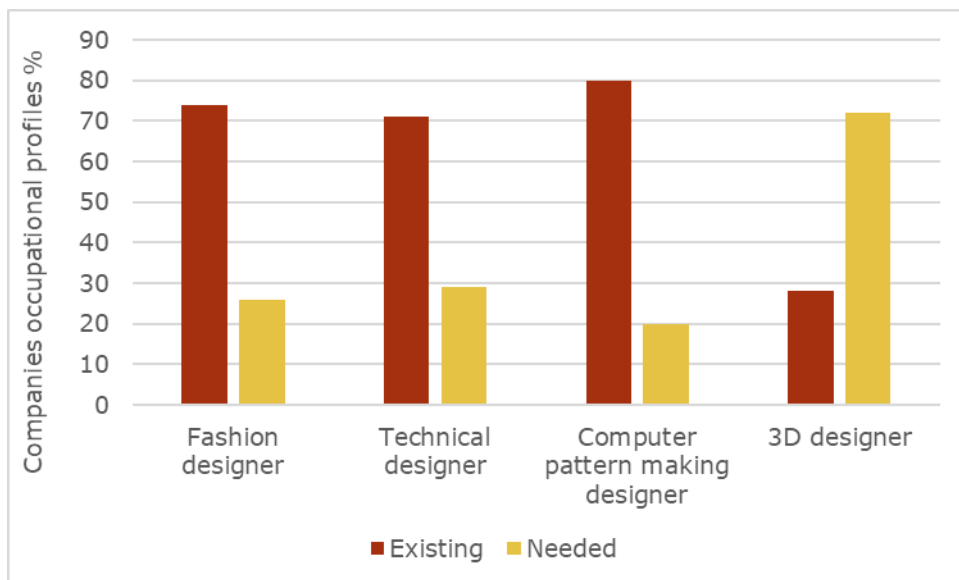


Figure 2.12: Existing and required occupational profiles in the field of garment design



The age expectation of the required occupational profiles is: 21 % under 25 years, 53 % between 25 and 30 years, 21 % between 31 and 40 years and only 5 % 40 years and over, Figure 2.13.

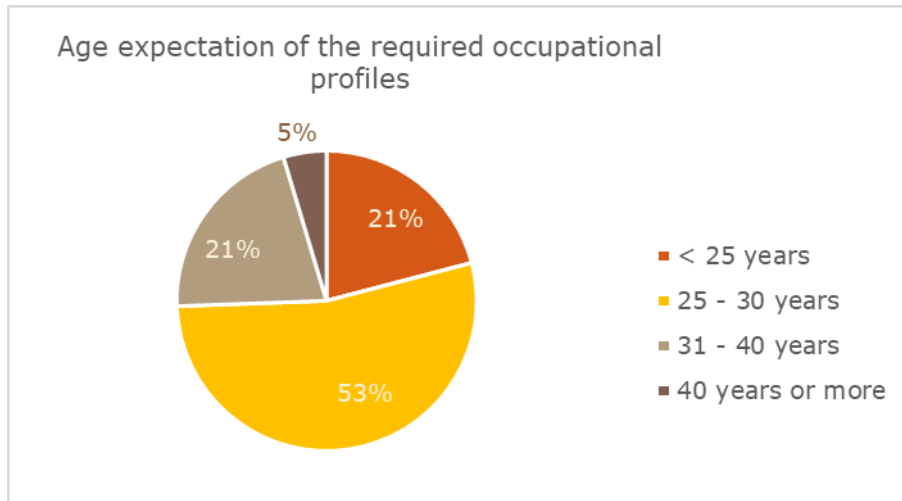


Figure 2.13: Age expectation of the required occupational profiles in the European companies surveyed

The European companies surveyed are interested in virtual 3D prototyping of garments in future development. 41 % of companies are interested in using virtual garment prototyping technologies in the future, especially for the development of garment patterns designs, 23 % for virtual 3D presentation of collections to customers, 15 % for virtual try-on, 9 % for offering/selling personalised garments through virtual presentation/selection and 12 % for other purposes, especially for training, Figure 2.14.

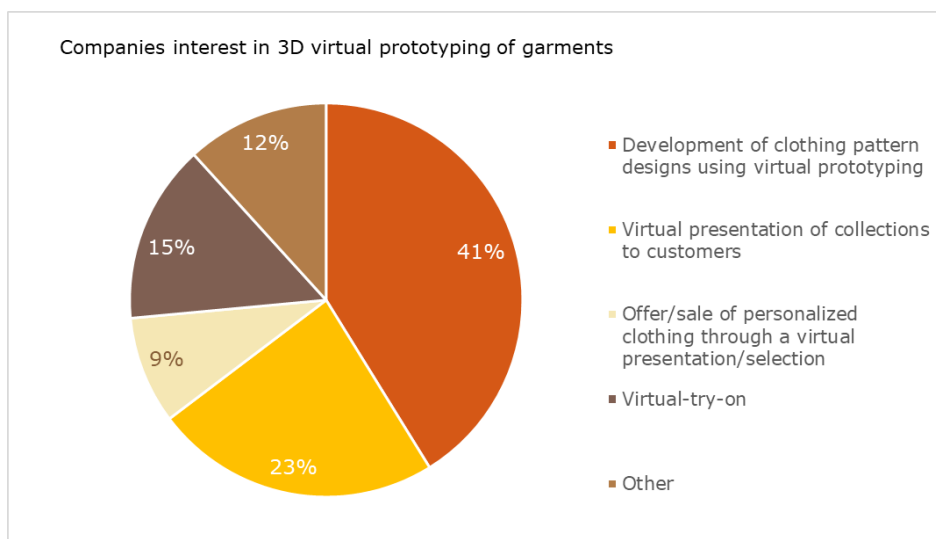


Figure 2.14: Companies interest in 3D virtual prototyping of garments in terms of future development



2.4 Conclusions

The survey found that 71 % of European clothing and fashion companies have no experience with virtual fashion technologies and 29 % do. These European companies (29 %) also have varying lengths of experience with these technologies: 25 % have experience from 1 to 3 years, 25 % from 4 to 5 years. Of the companies without experience, 65 % are interested in using virtual prototyping technologies in the future, especially for the development of garment pattern designs through virtual prototyping and virtual presentations of collections to customers.

It was found that the surveyed European companies mostly need (72 %) a new professional profile, 3D designers, who already have some experience and are between 25 and 30 years old. This shows that both students in faculties and secondary education institutions and professionals in companies urgently need to be trained in the use of virtual fashion technologies.

The survey showed that most companies describe their digital skills as medium for fashion drawing and illustration (66 %), technical drawing (44 %), designing garment patterns (42 %) and virtual prototyping, fitting and visualisation (32 %). For a good understanding and use of virtual fashion technologies and the creation of personalised virtual mannequins for the development of personalised clothing, companies employees should also have a good knowledge of the other skills, such as knowledge of human body anatomy and body measurements, textile materials and garment sewing. These skills are rated as good by 60% of companies, with the exception of knowledge of human body anatomy and body measurements (56% as medium). These results show that there is still a gap between current and required digital skills for companies to get closer to what they are aiming for, which is high knowledge and skills.

The analysis of the survey shows that the use of virtual fashion technologies is still a young and new branch in the development process of clothing and for the presentation of clothing on the fashion market for the European companies surveyed.

The survey among the European companies has shown that there is a need for training in the field of digital fashion, which the project partners will develop in the next project results with the help of a training platform for personalised virtual 3D fitting of garments.

The analysis of the survey shows that training with learning platform must be based on different teaching components, which for each garment include the presentation of:

- technical drawings of the garment to understand the pattern design of the garment,



- textile materials from the point of view of mechanical properties, in order to understand the appearance of the virtual garment when using different textile materials,
- textile materials from the point of view of their colour and haptics for the sensory perception of virtual garments, and
- 3D body models from the point of view of the possibility to adjust the body measurements and their influence on the selection of the garment in the appropriate size.



3 SHORT REPORT ON THE INTERVIEW WITH A FOCUS GROUP OF FASHION AND TEXTILE COMPANIES

The report on the interview of a focus group of fashion and textile companies aimed to identify orientations and needed digital skills for the fashion industry and the state of industrial application of virtual fashion technologies for each partner country.

The interview is based on the identified starting points of the survey analysis for each partner country and provides an in-depth exploration of the required digital skills and the integration of virtual technologies for prototyping personalised clothing in the fashion industry. It consisted of six supporting questions that served as the basis for conducting relevant interviews in the partner countries.

The interviews were conducted with at least three fashion or clothing companies per partner in the form of face-to-face, telephone, online or email interviews with people in management positions and/or technical staff.

In Romania, seven fashion or clothing companies were interviewed, four by partner INCDTP and three by partner TU Iasi. In Portugal, Slovenia and France, three fashion or clothing companies were interviewed, while the Belgian partners interviewed five companies.

The results of the interviews with focus groups of fashion and textile companies are presented in the form of national reports by the participating partners. In this short report we summarise the main conclusions of the interviews with companies in the five partner countries of the Erasmus+ DigitalFashion project: Romania, Portugal, Slovenia, Belgium and France.



3.1 Basic information about the interviewed European companies

In Romania, companies were interviewed that produce a wide range of products: from simple to very complex products, for women, men and children, from fabrics to knitwear. Some of the companies are large companies working for well-known brands and they do not need to do any promotional activities. Some of the companies interviewed are smaller, with their own collection. The promotion is mainly online, through social networks and online shops. Most of them have their own website. Trade fairs are also a good way to promote their products, but recently online advertising has taken over due to the pandemic situation.

In Portugal, the interview was conducted with a focus group of small and medium-sized enterprises. All three companies have their own brand, although two of the companies essentially make clothes for other brands. All of the companies have a good communication strategy with a clear presence on social networks, and one of the companies has its own retail shop. Another important component of communication is the fact that they are present at trade fairs.

All the Slovenian companies interviewed are smaller fashion companies that produce personalised fashion for the adult population, and two of them also have their own clothing collections for women or children. All of the companies use social networks to promote their activities and clothing, and two of them also offer online sales of clothing.

Of the five Belgian companies interviewed, only one produces high-fashion clothing for men, women and children. Two companies develop and produce professional protective and non-protective workwear, one company produces nightwear for all ages and the last company is one of the market leaders in women's underwear and swimwear. With the exception of the fashion company, almost all companies producing professional and protective clothing generate the majority of their turnover in B2B business. The fashion company sells mainly in its own shops. A small part (15%-20%) is sold through online platforms. Advertising is mainly done through the website, catalogue and social media.

The interviews in France were conducted with companies that design and manufacture a wide range of products: from simple garments to customised high-fashion products and workwear. One company is large and owns a well-known fashion brand with a well-developed traditional business model and advertising channels. But its e-shopping platform with online advertising is also well developed. One company owns a high fashion brand that is very well known in the affluent population of Western Europe with a well-developed e-shopping and e-promotion platform. The last company is a young fashion company that offers work suits and has well-developed social media and an e-shopping platform for sales. Communication with customers is usually done through email, social media and online meetings.



3.2 Software for garment construction

The companies surveyed in Romania use special software for fashion sketches such as Corel Draw. In some cases, sketches are made by hand. The construction of the garments is done with special software in most cases. Gemini is the most popular, followed by Gerber and Lectra. However, some companies combine both methods: manual and computer. In the specific case of knitwear, a Shima Seiki soft is used. However, some of the smallest companies only create the patterns manually.

All three Portuguese companies interviewed have garment construction software, Gerber and Lectra.

For the development of garments, the Slovenian companies interviewed use fashion and technical sketches, which they draw by hand or with the help of software. The construction of garments is done by hand in all companies, as is the fitting of tailor-made clothing.

All the Belgian companies interviewed use Adobe Illustrator for sketches and technical drawings, only one company also uses Canvas and Lectra Kaleido. Two companies also use Adobe Photoshop and the underwear company is experimenting with Clo3d. Three companies make their patterns in-house with software from Lectra, Gerber or Investronica. For two companies, pattern making is done by subcontractors using Lectra and Assyst. All companies of course use the usual office software and the majority have a PLM and/or ERP system.

In the French companies interviewed, the fashion sketches are made with special software; Adobe Photoshop is the most popular. Sometimes the sketches are also made by hand. In most cases, the construction of the garments is done with special software. Lectra and Gerber are the most popular programmes. In many cases, both manual and CAD-based garment construction are used together, especially in the specific case of workwear design. The reason for this is that some specific skills in garment construction cannot be fully transferred to the CAD environment.

3.3 Software for virtual 3D prototyping of clothing

Most of the Romanian companies interviewed would like to use virtual 3D prototyping for the development of garments pattern designs in the future. This will depend on the future of the clothing industry. All interviewed companies are open to the use of virtual 3D prototyping for the development of garments pattern designs, two of them are already using it. The advantages of this type of software are obvious to all companies, the limitations are the price and the uncertainty about the future of the companies due to the pandemic crisis.



None of the three Portuguese companies use 3D, but two of them mentioned that they are thinking about investing in 3D in the future. The other company stated that they do not plan to invest in 3D in the future.

As far as virtual fashion technologies are concerned, the Slovenian companies interviewed are generally familiar with them, even if they do not intend to implement to the 3D software CAD PDS soon. Two companies are familiar with the 2D software CAD PDS for garment pattern design and only one company has basic knowledge in 3D virtual prototyping of garments.

With the exception of the Belgian lingerie company, none of the Belgian companies interviewed have experience with 3D virtual fitting software, but all are looking into the possibilities of implementing this in the future. The lingerie company only uses Clo3d for visualisation and not for fitting.

All interviewed companies in France would like to use virtual 3D prototyping for the development of garments pattern design in the future. This will depend on the market development of the fashion industry and the training opportunities for digital fashion designers. All interviewed companies are open to the use of virtual 3D prototyping for the development of garments pattern designs. However, they would like to develop more skills in the 3D virtual design environment in terms of design knowledge and material characterisation. However, the digital design environment created with the tools from CAD should have a strong connection and interaction with the current real design environment where designers and brand managers also master mature skills in all aspects.

3.4 Other types of software tools

In Romania, companies also use other types of software: for accounting, shipping, production SSD (Standard Sewing Data), by DataS, for the cutting room and for embroidery. Software for accounting and shipping is of course the most commonly used, followed by, depending on the size of the company, specialised software for the manufacturing areas. Most of the companies surveyed use different types of software, which means that they are open to the digitalisation process and have employees with basic training in this area. Although the type of companies surveyed is very broad, they all use different software programmes in their operations and there is a need for more. There is certainly a need for digital skills for fashion design.

On a global level, it could be seen among the Portuguese companies interviewed that they are concerned about technological development and the importance of digitalisation. On the other hand, one of the companies opposes this development.



The Slovenian companies interviewed also use the software to draw patterns for digital printing of fabrics. One of the companies intends to use the 2D CAD software for designing garment patterns in the future, while the other company is in the process of developing garments with personalised embroidery patterns and wants to offer them on the market using the virtual fitting technology.

All the Belgian companies interviewed also use the usual office software and most of them have a PLM and/or ERP system as well as software such as Le new black, Zendesk, Metapack, Orli-cegid, LECTRA Diamino, design software for embroidery, label programme to create the composition labels.

E-commerce software based on PHP, automatic sewing software and cutting software are used by the French companies interviewed.

3.5 Conclusions

The interviews in the project partner countries were conducted with companies of different sizes and with different garment production programmes. Most companies use software to draw fashion and technical sketches and to construct garment patterns. However, in some companies, garment pattern designs are created by hand, indicating the need for additional digital skills.

Most of the European companies interviewed would like to use virtual 3D prototyping for garment pattern development in the future. However, they point out that this depends on the market development of the fashion industry and the training opportunities for digital fashion designers, who need to develop more skills for virtual 3D prototyping in terms of design knowledge and material characterisation. In addition, most of the companies interviewed use different types of software. This means that they are open to the digitalisation process, even if they have employees with basic training in this field. Although the companies surveyed differ in nature, they use different software programmes in their activities and there is a need for more, which underlines the need to improve digital skills for fashion design.



4 SHORT REPORT ON THE LEARNING REQUIREMENTS OF DISADVANTAGED GROUPS

The challenge of education in a digital world forces us to open up education as much as possible through flexible ways and innovative thinking to allow everyone to adapt and be prepared for the unknown developments of the future. A suitable digital fashion design platform based on information technology can provide the necessary support to achieve this goal.

One of the main goals of the DigitalFashion project is to develop new training methods and materials in the digital domain that will enable students and professionals to quickly master key technologies for the design and production of customized products in a virtual environment.

A responsible society must give all groups of people the opportunity to educate themselves in a particular field. The goal of the DigitalFashion project is to provide online learning that is accessible to all groups of people who can further their education in the field of digital fashion.

The first part of this short report identifies the disadvantaged groups for which the project is intended. The second part of this report provides a summary analysis of the learning needs of some of the disabled groups who are eligible for digital training and require assistive technologies for online learning. Two of the partners are institutes (INCDTP - Bucharest, Romania, CITEVE - Famalicão, Portugal). Therefore, the analysis focused on the situation of disadvantaged groups within the textile industry workforce by interviewing nine textile and clothing companies in Romania, while CITEVE focused on the institutional reality as well as the national reality regarding access to higher education for applicants with disabilities. University project partners (UNI Maribor, TUIASI, HOGENT, ENSAIT) analysed the situation of disadvantaged groups of students within the university and conducted an interview with a disabled student or a staff member who has experience with them.

The report on the learning needs of disadvantaged groups aimed to identify guidelines for the required teaching methods for collaborative international online learning in the field of digital fashion.



4.1 Disadvantaged groups

According to the European Institute for Gender Equality (EIGE) disadvantaged groups (<https://eige.europa.eu/thesaurus/terms/1083>) are groups of people who have/deal with:

- a higher risk of poverty, social exclusion,
- discrimination and violence,
- the general population, including, but not limited to, ethnic minorities, migrants,
- people with disabilities,
- isolated older people and children.

These groups of people have learning difficulties and some of them need special requirements and assistive technologies for training and learning at their own pace and some of them need adaptations to the workplace.

Online training and learning in digital fashion can be made accessible to most people in the groups listed who are willing and able to learn in the field of digital fashion. Online training offers a lot of advantages, such as distance learning, flexible learning times and exceptional multimedia support.

The DigitalFashion project's training platform and teaching materials will be prepared in English, while the teaching materials will be also translated into five partner languages: French, Portuguese, Slovenian, Romanian and Dutch. In this way, we can involve more people in digital fashion education by removing the barrier of language, distance, social exclusion, discrimination, and gender.

The COVID19 pandemic disrupted the education of millions of students around the world. As a result, educational institutions were forced to switch overnight to online teaching software such as Zoom, Google Classroom, Microsoft Teams, Blackboard, Slack, Floop, etc., and online teaching and learning became the main teaching method during the pandemic. The DigitalFashion project supports the teaching and learning process of fashion design with online teaching methods even for such possible future situations.

It can be exposed that the new online fashion design training method based on 3D virtual prototyping and training materials can fully accommodate different types of students:

- regular students,
- Erasmus, Ceepus students,
- top athletes,
- recognized artists,
- long-term ill or injured students.



In addition, online learning of digital fashion can also be directed to students, such as:

- pregnant women with problems and
- mothers/fathers who can only learn at home.

Disadvantaged groups include people with disabilities, such as the visually impaired, hearing impaired, mobility impaired, etc., who need special requirements and assistive technologies for online learning.

4.1.1 Access issues for people with disabilities

Adaptive technology makes it possible for almost anyone to access computer resources. It includes specialised hardware and software that enable people with acquired skills to use computers productively. Examples of access difficulties faced by students and lecturers in typical distance learning courses are described below (<https://www.washington.edu/doit/distance-learning>):

1. Visually impairments: A blind student or teacher may use a computer equipped with text-to-speech software and a speech synthesizer (the system reads the text on the screen with a synthesized voice). Typically, they use a text-only browser to navigate the Internet, while the graphics loading feature of a multimedia web browser is turned off, because it cannot interpret graphics if there is no text to describe a graphic. Text-to-speech software also has problems with printed materials, videos, and other visual teaching/learning materials.

Students with limited vision can use special software to enlarge screen images because they can only see a small portion of a web page at a time. Cluttered web pages and a page layout that changes from page to page can confuse students with limited vision.

2. Hearing impairments: Most internet resources are accessible to people with hearing disabilities because they do not require hearing. When websites contain only audio output without providing text captions or transcription, this group of students is denied access to the information. Video presentations without captions are also inaccessible to the deaf. Deaf students are also unable to participate in teleconferences that may be part of a distance learning course.
3. Mobility impairments: Students with a variety of mobility impairments can enroll in a distance learning course. Some of them cannot use their hands at all and use alternative keyboards, digital pens, voice input, and other input devices to access



all Internet-based course materials and navigation aids. Some mobility-impaired students use keyboard commands as a substitute for mouse functions and therefore cannot fully operate software that requires the use of the mouse. Some students with mobility impairments do not have the fine motor skills necessary to select small buttons on the screen. Those who are very slow with computers have difficulty participating effectively in real-time teaching.

4.2 Analysis on learning requirements of disadvantaged groups of European project partners

In order to make online teaching and learning in fashion design accessible to all groups of people who are willing and able to be trained, all partners have conducted a needs analysis for the learning requirements of people with disabilities.

The analysis focuses specifically on visually, hearing and mobility impaired people. In each partner university and institute, a disabled bachelor or master student or staff member was involved in collecting information on the learning needs of people with disabilities.

In addition, research has been carried out at partner universities on teaching and learning support for special status students, such as: top athletes, recognized artists, students with long-term injuries or illnesses and mothers/fathers who need to be provided with online teaching and learning opportunities.

In Romania, both textile students and workers with minor disabilities may encounter adaptation difficulties in the workplace. The Faculty of Textiles at TU IASI University and the national R&D Institute for textiles and leather, as main education and training providers in textiles at national level, have conducted an analysis of the situation of less advantaged groups of students and workers. The Technical University of Iasi supports less advantaged groups of students, especially those from abroad, as the students from the Republic of Moldavia and the students with socio-economic problems. INCDTP – Bucharest conducts applied research and by having good connections to the textile enterprises, offered a situation of support measures for persons with impairments of the textile industry.

Persons with minor impairments and of other nationalities are supported and integrated into textile enterprises. Depending on the nature of difficulty, including the emergency situation due to pandemic, various support actions were provided by the T&C companies.

The online training instruments provided by the DigitalFashion project are accessible for students and employees in textiles with minor impairments too, according to the



conducted study. Single visual impairment could hinder access to the educational materials. On the other hand, students and workers with mobility impairment, which was reported as the most frequent impairment, can benefit from distance learning and flexible learning times. Students and workers from abroad may benefit of the multilingual educational materials of DigitalFashion too. The educational materials will be produced in following European languages: French, Dutch, Slovenian, Romanian, Portuguese and English. The identification of technical terms and multicultural environment will support people from abroad.

The virtual educational instruments envisaged by DigitalFashion will integrate less advantaged groups of persons by education and training into the textile community and the world-of-work.

In Portugal, Vocational and Higher Education implement a set of measures, oriented by the Government, for the integration of disadvantaged groups. These measures foresee non-discrimination and equal access to all citizens. In the last two years, due to the COVID19 Pandemic, the implementation of measures to support distance learning has increased significantly and there is a concern on the part of educational institutions to create adequate response mechanisms for all situations. CITEVE follows this guideline, not only at the educational level, but also at the professional level. Due to the success of the results achieved, this will be a measure to be maintained and improved in terms of implementation.

In Slovenia, based on the analysis of students with special status at the university and faculty level, focusing on visually, hearing and mobility impaired students, as well as students of top athletes, recognized artists, students with long-term injuries or illnesses, mothers/fathers, we can conclude that their number at the University of Maribor and its member, the Faculty of Mechanical Engineering, is not negligible. Special status students face special circumstances or challenges that prevent or impede their full and effective inclusion and participation in the academic process. In order for them to acquire the required knowledge and skills and successfully complete their studies, special status students are entitled to certain accommodations. This gap can also be addressed in the teaching of fashion design through online learning in digital fashion, which is the goal of the DigitalFashion project and enables all regular and special status students considered in this analysis to study digital fashion. Therefore, the teaching methods and preparation of teaching materials need to be considered in the future project results according to the recommendations for online learning for visually, hearing and mobility impaired students.



In Belgium, based on the feedback we have received, we can conclude that the number of students (from Professional Bachelors in Fashion and Textiles) with special status has increased in the last years, i.e. from 29 students in 2019-2020 to 58 students in 2021-2022. HOGENT wants to provide equal opportunities to every student and thus different types of support are offered to the students with disabilities trying to enable an individual educational and examination measure with respect to the needs of the student. On top of this, HOGENT offers all students free compensatory (reading) software "Alinea in the Cloud" that helps with reading, writing and studying. When designing the teaching methods and preparing the teaching materials for the DigitalFashion project, special attention is given to the students with disabilities.

In France, fashion designers with physical disabilities encounter more or less difficulties in the workplace due to their physical and psychological limitations. In this context, control and optimization of garment appearance will be a key issue for adapted clothing design. Fashion design has been considered as a key professional opportunity for people with disabilities, especially for those having interests and talents for artistic creation and manual work. They are particularly interested by using digital technology in their design work, which can help them to remove physical restrictions and work in any places adapted to their personalised needs.

The digital online training proposed by the DigitalFashion platform will effectively improve the working and training conditions of less advantaged groups of fashion designers and providing new professional opportunities to young disabled people interested in fashion design. All training, communication and promotion activities will be realized in a fully digital environment. Moreover, designers and producers of adapted fashion products will also take advantages from the DigitalFashion platform in order to quickly promote their latest works to target consumer public and concerned professional institutions (e.g. fashion salons).

4.3 Conclusions

Teaching fashion design through online learning of digital fashion is the aim of the DigitalFashion project and it addresses all groups of people, regular and disadvantaged students and professionals considered in this analysis. Therefore, the teaching methods and the creation of teaching materials need to be considered in the future project results according to the recommendations for online learning for visually, hearing and mobility impaired people.



5 CONCLUSIONS

The analyses of the survey and the interviews show that the use of virtual fashion technologies in the clothing development process and for the presentation of clothing on the fashion market is still a rather young and new branch for the European companies. Most of the interviewed companies use different types of software in the garment development and production process. However, it was found that there is still a gap between current and needed digital skills for companies to get closer to their goal, which is a high level of knowledge and digital skills for fashion design. This means that they are open to the digitalisation process, even if they have employees with basic training in this field.

The survey and interviews among the European fashion and clothing companies have shown that there is a need for training in digital fashion, which the project partners will develop in the next project results with the help of a training platform for personalised 3D virtual try-on of garments.

The analysis of the survey and interviews shows that the training with the learning platform needs to be based on different teaching components that include for each garment the presentation of:

- technical drawings of the garment to understand the pattern design of the garment,
- textile materials from the point of view of mechanical properties, in order to understand the appearance of the virtual garment when using different textile materials,
- textile materials from the point of view of their colour and haptics for the sensory perception of virtual garments, and
- 3D body models from the point of view of the possibility to adjust the body measurements and their influence on the selection of the garment in the appropriate size.

The DigitalFashion project supports the norms of a responsible society, which advocates that all groups of people should have the opportunity to educate themselves in a particular field. Therefore, online learning, which is accessible to all groups of people



who can further their education in the field of digital fashion, is a priority area of the DigitalFashion project. Therefore, the teaching methods and the creation of teaching materials need to be considered in the future project results according to the recommendations for online learning for visually, hearing and mobility impaired people.

The online digital training proposed by the DigitalFashion platform will effectively improve the working and training conditions of disadvantaged groups of fashion designers and open up new career opportunities for young people with disabilities who are interested in fashion design. All training, communication and promotion activities will be carried out in a fully digital environment. In addition, designers and manufacturers of adapted fashion products will also take advantage of the DigitalFashion platform to quickly present their latest work to an interested audience and the professional institutions concerned.



ERASMUS +

KA2

KA220 – HED – Cooperation partnerships in higher education

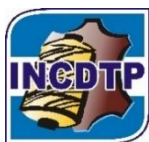
Grant Agreement: 2021-1-RO01-KA220-HED-000031150

Project duration:

01st February 2022 – 31st January 2025

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

© 2022-2025 DIGITALFASHION Consortium Partners. All rights reserved. All trademarks and other rights on third party products mentioned in this document are acknowledged and owned by the respective holders.



Institutul National de Cercetare-
dezvoltare Pentru Textile si
Pielari
Romania

www.certex.ro

ensait
ROUBAIN
ÉCOLE D'INGÉNIEURS TEXTILES

Université
de Lille

Ecole Nationale Supérieure Arts
Industries Textiles
France

www.ensait.fr

FTILAB+
**HO
GENT**

Hogeschool Gent
Belgium

www.hogent.be



Univerza v Mariboru
Slovenia

www.um.si


citeve

Centro Tecnológico das
Indústrias Têxtil e do Vestuário
de Portugal
Portugal

www.citeve.pt



Universitatea Tehnică Gheorghe
Asachi Din Iasi
Romania

www.tuiasi.ro



