Universidade do Minho
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Collaborative online learning model for fashion design.

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Collaborative Online Learning Model for Fashion Design

Tese de Doutoramento
Programa Doutoral em Design de Moda

Trabalho efetuado sob a orientação do(a)
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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

Modelo de aprendizagem colaborativa e online para o design de moda.

Resumo

O setor de ensino superior enfrenta e enfrentará novos desafios considerando as mudanças no contexto socioeconômico/tecnológico global e das mudanças paradigmáticas no contexto socio económico global, aceleradas pelo confinamento social provocado pela pandemia de Covid.

No atual contexto, a educação em design de moda tem vindo a confrontar-se com problemas como a estrutura dos cursos, o conteúdo e a validação da aprendizagem, os requisitos e limitações do setor, a conversão de informações antecipadas em conteúdos válidos e atualizados, os padrões de qualidade, e a necessidade das empresas que precisam de acesso rápido às novas competências. Será a aprendizagem colaborativa online uma resposta viável para o design de moda, atendendo às necessidades de aprendizagem atuais e futuras do setor?

Este projeto de investigação, tem como questão central verificar em que medida a aprendizagem colaborativa online em design de moda, numa perspetiva ao longo da vida, proporciona uma formação prospetiva, personalizada, heterogénea, eficaz e atualizada, em tempo oportuno e a custos acessíveis, para estudantes e grupos profissionais do setor.

A investigação realizada, de caráter qualitativo, organizou as etapas do procedimento para responder à questão de pesquisa da seguinte forma:

- Pesquisa exploratória, caracterizada por questionários aplicados a profissionais do setor e à análise de cursos de design de moda oferecidos online no Espaço Europeu Superior (EHEA).
- Pesquisa documental e bibliográfica sobre educação em design de moda e estudos sobre tecnologias de aprendizagem em design de moda. A definição de um quadro teórico e princípios de apoio ao modelo de aprendizagem.
- Desenvolvimento, implementação e teste do modelo numa unidade curricular experimental.
- Recolha de dados durante o período de observação intensiva e posterior análise dos dados por meio do procedimento de análise temática.

A pesquisa validou o modelo de aprendizagem colaborativa online em design de moda, considerando-o uma alternativa viável para responder às necessidades da área do conhecimento. A pesquisa também contribuiu para futuros estudos sobre a educação em design de moda que abordem novos modelos pedagógicos de ensino/aprendizagem neste domínio do conhecimento.

Palavras-chave: aprendizagem colaborativa online, design de moda, educação superior, heutagogia.

Collaborative online learning model for fashion design

Abstract

The higher education sector faces and will face new challenges considering the changes in the global socio-economic/technological context and the paradigmatic changes in the global socio-economic context, accelerated by the social confinement caused by the Covid pandemic. In the current context, education in fashion design has been confronted with problems such as the structure, content and validation of learning, the requirements and limitations of the sector, the conversion of prospective information into valid content, quality and up-to-date standards and companies that need rapid access to skills. Is online collaborative learning a viable answer to fashion design, meeting the sector's todays and future learning needs?

The central question of this research project was to verify to what extent collaborative online learning in fashion design, within a lifelong perspective, provides prospective, personalised, heterogeneous, effective, and updated education, in a timely manner and at affordable costs, for students and professional groups in the sector. The qualitative investigation organised the research design to answer the research question as follows:

- Exploratory research characterised by questionnaires applied with professionals and analysis of fashion design courses offered online within the Higher European Area (EHEA).
- Documental and bibliographic research about fashion design education and studies on technologies of learning in fashion design. The definition of a theoretical framework and principles to support the model of learning.
- Development, implementation and testing of the model in a trial course unit.
- Data collection through intensive observation period and analysis, through framework analysis procedure.

The research evaluated the online collaborative learning model in fashion design, considering it a viable alternative to respond to the needs of the area of knowledge. The research also contributed to future studies on education in fashion design that address new pedagogical models of teaching/learning in this field of knowledge.

Key words: collaborative online learning, fashion design, heutagogy, higher education.

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List of Abbreviations

AM_LC	Analytical matrix related to the Learning Contract component
AM_LD	Analytical matrix related to the Learning Discovery component
AM_LE	Analytical matrix related to the Learning Experience component
COL4FASHION	Collaborative online learning model for fashion design
FDOC	Fashion design online course, the name of the trial course unit
FDLP	Fashion design learning principles
HLAM	Higher level analytical matrix, which related the learning components with the research questions
LC	Learning Contract component
LD	Learning Discovery component
LE	Learning Experience component
PLA	Personalised Learning Contract
PLM	Personalised Learning Manager
NLC	Negotiable learning components of the standard Learning Contract
QAMs	Questionnaires, quizzes, Assignments, Meetings – instruments of data collection

Introduction

1.1 Background of the study

The education of fashion designers needs to balance creativity and the ability to manage production techniques and processes. It also requires understanding the instabilities of the global market reality, anticipating changes and innovating in face of socioeconomic and technological transformations. The need for new skills is more stressed when, encouraged by high levels of competitiveness and high unemployment rates, adult professionals need to continue learning throughout their lives. Thus, fragmented learning processes arise, to recycle, deepen, or convert the set of competences gained, and meet the momentary demands of the market, without, however, guaranteeing a professional future in the long-term. While the global socio-economic context is pressured for new skills acquisition, the post-pandemic landscape will create techno-scientific disruption, demanding not only additional skill sets, but new ways of learning.

Hence, the education of fashion designers needs to adopt a continuing and prospective approach, looking at the future needs of the sector, to establish, in advance and in good time, the continuity and flexibility of the learning paths. This will suit a broader professional context, accompanied by the mobility and adaptability of the future professional and of the professionals in the future. Despite new initiatives surfaced during the Covid-19 pandemic, traditional models of higher education continued focusing on knowledge acquisition with a view on the market, without adequate conditions, methods or approaches to anticipate the skill companies will need or to satisfy the multiplicity and heterogeneity of adult individuals, with different learning paths and with different needs in terms of knowledge and skills acquisition. It is necessary to think of learning models that create greater continuity between education and professional sectors, preparing future designers to learn throughout their lives as they address issues such as innovation, sustainability, consumption and waste, co-creation, among other aspects.

1.2 Problem statement and motivation for the study

The major point of concern when starting the research was the lack of studies about education in fashion design. While the fashion professional sector is embracing changes brought by digital technologies, virtual environments and augmented reality, fashion education adopts a responsive posture to adapt the course as the market demands. The lack of studies in fashion education relies on establishing fashion competencies to meet the market needs. However, it is not enough to educate for the market, because the market is in constant change. The adequacy of the market is not a guarantee of future

professional adaptability. The role of education in fashion design is to prepare professionals for the long term, as self-determined, self-sufficient designers, that can think prospectively about their career paths and about future changes in the sector. Not aligning fashion education with the future of the sector means not bringing innovation to the fashion system. This showed the need for further investigation that could contribute to education in fashion design so that it can directly or indirectly help create sustainable and competitive global brands and systems, to bring innovation in the fashion value chain.

New learning models, based on new ways of sharing knowledge, in collaborative environments, in communities that go beyond the physical classroom and cross borders or languages, presented opportunity to research how new technologies and methods could be applied to fashion design.

It seemed important to re-examine learning methodologies and propose new models, structured in online or virtual environments, resorting to digital technologies and devices. This study would provide evidence about the effective and meaningful learning in the online environment and indication if it could offer a valid contribution to the needs of individuals and to the market, coherent with the complex reality of the fashion system.

Although there are studies and theories about distance learning, lifelong learning and even about the use of virtual and augmented technologies for learning (resources, programs, platforms), there were few studies on the use of these new technologies in fashion design, which has a set of very specific needs in terms of content, dynamics, working methods, and expected results.

At the theoretical level, this research aimed to contribute to develop future studies on education and learning in fashion design, presenting theoretical approaches, using digital technologies, and reassessing the traditional methods of learning in the area. This might also contribute to increase the quality of knowledge in the sector and, thus, facilitate the knowledge updating, skills prospecting and make professional reconversion/change more flexible. The importance of the research also lies in the analysis of the existing offer and in the methods for validating the learning of fashion design, more in line with the global reality of the fashion system. At a practical level, the research will use digital technologies to propose learning that foresees the needs of students/professionals in the sector. The research did not intend to present a single and true answer to education and learning in the fashion design sector, but to present an alternative model, based on a solid theoretical framework that supports the use of digital technologies to educate the creative areas and that proposes credible knowledge validation mechanisms, with the aim of quickly and effectively adapting and anticipating learning needs, integrating, and bringing learning closer to the market.

1.3 Aim and scope

The aim of the investigation was to study and propose a collaborative online learning model for fashion design higher education, centred on continuous updating and prospecting of knowledge and centred on the lifelong learning needs and specificities of different professional groups.

Therefore, the investigation focused on higher education in fashion design, addressing collaborative and online models of learning. Given that the research was investigating online learning environments, it could select participants regardless of their geographic location, based on their expertise, characteristics, and expectations. The sampling plan used the snowball and purposive sampling technique, starting with close contacts of the researcher, until form groups of fashion design professionals, invited to test the learning environment proposed by the investigation.

1.4 Significance of the study

In this research timing played a major role. One year earlier the perception and commitment of the participants of the research, of the fashion professionals and certainly of the academic community would be different. However, the pandemic forced all sectors to move to online, and the digital tools we used from time to time became our primary form of working, communicating, creating, studying. The research focus became not just important: the current situation brought online learning into a new reality and made it work at all levels of education systems, as well as throughout society.

We remained connected and involved through technology, and brands have opened more digital, and interactive user-centred experiences. After the pandemic, there is a more receptive “mood” and greater discussions towards the online, virtual, and augmented reality in learning. There is also the understanding that education needs to change and fast. And education in fashion design needs to change to educate fashion designers as autonomous learners, creative professionals that work with future information to envision processes and techniques that can create a fashion design system more sustainable, inclusive, and fair.

So, the basis of this thesis contribution is the theory development in fashion design education. The major innovative contribution of this research project is the identification of a coherent theoretical framework and principles of learning in fashion design that supported the use of digital technologies and the development of a collaborative online learning model. The research contributed with methods, procedures, perspectives and deep-thinking about education in fashion design, and about learning fashion in online, virtual, and immersive environments. The creation of prospective mechanisms associated with the model for the detection of future skills was also a contribution to the field. The

innovative contribution of the developed learning model for fashion design presents a significant impact over learners, professionals and companies allowing the access to prospective knowledge in a good time and at affordable costs, while maintaining the quality of learning.

1.5 The research problem

The discrepancy between education and professional realms has been a well-known problem within the fashion sector for a while. On one side, traditional outdated models of education and on the other side the professional sector increasingly competitive and globally connected. However, during the Covid-19 pandemic, facing the sanitary and social distancing impositions, the fashion sector had to adapt fast its processes to new models of production, distribution, communication, and sales. Similarly, education had to adopt different models of learning, and this meant to admit the need for digital technologies within learning environments. The disruptive crisis created by the pandemic clearly enhanced old problems about traditional education models which collided with old problems of the 'fast fashion' system. It enhanced the concerns with the employability of young people and adults (employed or not), as well as the pressure for (re) qualification, (re) updating, and limitations of time and resources. The rise in competitiveness and the constant need for innovation increased exponentially, putting pressure on companies, which needed professionals with specific skills to recover their businesses, and on professionals whose employability in the job market became more uncertain and unstable than ever, since a new set of competences, based on remote working, became imperative. One of the main key points evidenced in the literature review was the dependency and the responsive strategy of the education sector to the constant renewal of competences. The pandemic crisis proved that the skills and knowledge fashion professionals needed and will need were not the ones they are being educated in. These were, is and will be incompatible with the sector needs, with the future of the fashion designer profession, with personal needs, and with the changes in the environmental, socio-economic scenario, globally. Fashion global unstable technological market will require an alternative approach of education for the next generation of fashion designers. This approach for fashion education is more likely to be a set of approaches not limited by the materiality of the atelier, of building more clothes to feed a linear system that ends up in the landfills. It will not educate under the principles of the knowledge economy paradigms, which focused on developing pre-defined competences, since these will keep changing. Fashion designers need to be educated under a lifelong perspective, based on self-determined capabilities, on flexibility and adaptability. But how to do that? Suddenly, the problem identified at the beginning of this research project, before the Covid-19 pandemic, became relevant.

So, resorting to the theoretical framework devised by the literature review and that considered approaches of Constructivism through Heutagogy, the meaning making of the Social Semiotics, and the 'openness' of the dialogical cycle of Design Theory, the research problem presented further factors to study:

- Principles needed for a fashion design learning model that provides the content as needed by different adult individuals.
- Principles needed to validate and assess the competences learned through the model to meet both individual and company needs.
- Requirements and limitations of the fashion design area to be integrated into a learning model.
- A model fed by forward-looking information about emerging skills in the market and that converts that information into education programs in a timely manner for the integration into the economy.
- Guarantee that companies have access to the new competences they need in good time, so that they can integrate them into their competitiveness factors.
- A model that provides high-quality training from a scientific, technological, and educational point of view, updated, at acceptable costs for companies/individuals/organisations.

1.6 The research question

The research started with an acknowledged problem in the educational models of fashion design. This triggered a process of discovery, conducted by exploratory research, through the preliminary review of the literature, the study of the higher education courses in EHEA and interviews with experts. The process helped to understand the problem, and articulate the research question:

Does collaborative online learning comprise a valid model, able to promote the constant update of knowledge in fashion design, efficiently, with high-quality standards at acceptable costs for the sector professionals?

The research question, broken down into three sub-questions, helped to operationalize the study, and aligned with the theoretical framework and to the principles defined for the collaborative online learning model.

- Research question 1 Collaborative learning (RQ1) - Is this model compatible with the current and future demands and socioeconomic contexts that influence the current systems of teaching / learning in fashion design?

- Research question 2 Prospective learning (RQ2) - Will the model promote anticipative knowledge in fashion design, with high-quality standards at acceptable costs, contributing to diminish the gap between the fashion academy and fashion professional sectors?
- Research question 3 Personalised learning (RQ3) - Will this model satisfy the personalised learning needs and specificities of the different professionals' groups and companies?

In this sense, the three research questions conveyed a hypothesis-driven exercise that guided the 'what and how' of the data to observe and collect. According to Marconi and Lakatos (2003) the hypotheses propose a provisional solution or an educated guess to the research problem and that they must be verifiable. This approach helped to construct a collaborative online learning model to be tested as a valid solution to the research problem and to respond to the research questions. The test of the model, in a simulated environment, would allow the following aspects to be observed:

- Collect and confirm the gained knowledge through digital-technological approaches to learning.
- A collaborative online learning environment that can foresee the professional needs of the fashion sector.
- Implementing quality mechanisms, through a self-determined approach, that can contribute to evaluate the collaborative online learning model.
- Collaborative online learning that can enrich and update fashion design contents anticipating the sector's needs.

Still, there was no "hypothesis/null hypothesis" relation and no variables to manipulate, to prove or disprove, as in hypothetical-deductive research. The research did not mean to generalise the results, verifying it in a larger population, but use qualitative methods to understand if the collaborative online model might open opportunities for alternative scenarios of learning.

1.7 The research goals

The main purpose of this research was to propose a collaborative online learning model for fashion design aimed at the adult audience, supported by coherent theoretical background, to meet the specificities of professional groups.

However, the goal of this research was not verifying the acquisition of technical or creative competences through online learning, but to study a model of learning as a strategy within the lifelong learning perspective, to identify, update and anticipate future competences and educate fashion designers capable to change the established scenario instead of repeating it.

To accomplish these goals, the research proposed the following specific objectives:

- Identify the knowledge and the set of skills necessary for the fashion design professional in a global market, considering the digital technology "immersiveness".
- Identify and analyse higher education (and postgraduate) courses in fashion design offered in online environments.
- Develop a collaborative online learning model for higher education in fashion design that anticipates future competences.
- Analyse the learning quality and the validation of gained skills within the model, grounded by an educational approach.
- Test the developed model.

1.8 The philosophical perspectives

The philosophical foundations of the investigation helped define the methodological path adopted. It followed an exercise to identify the researcher's position and the epistemological perspectives that influenced the research methods and the inductive and deductive procedures used in the research design (Campenhoudt et al., 1995; Creswell & Creswell, 2017). It also exposed the connection between the theoretical stance adopted, the methodology and methods used, and the researcher's view. Since this research considered learning as a constructive process, in which different methods build the knowledge, respecting different perspectives, then the epistemological approach adopted resorted to constructivism (Adam, 2017; Elkind, 2004).

The constructivist perspective requires a qualitative type of investigation instigated by broad questions or emerging problems (inductive procedure) that the research will attempt to change or improve. Here, the role of the researcher, which determines the framework or the focus of the investigation, is immersive, and many times collaborates with participants to collect and interpret qualitative information and focusing on participants' meanings, personal and contextualised perspectives. The research then confirms the findings through triangulation and interpretation of observed results. Adopting the constructivism approach in this research meant to propose and test a model of learning and observe it in a simulated setting. The findings would educate and contribute to research in the field.

So, the philosophical position of the research did not aim to "explain or predict" the findings, but to understand new possibilities of a collaborative online model for fashion design education and resort to valid theories to build such a model.

Therefore, the inductive reasoning supported the procedures for the literature review, finding and studying theories of education to define a theoretical framework and the learning principles for a

collaborative, online learning model for fashion design, suitable for the specificities of the fashion design sector. The literature research and review of direct documentation, surveyed information in primary and secondary sources, namely publications of public and official entities, such as the European Commission, Digital Agenda for Europe Initiative, Open Education Europe Initiative, Directorate General for Education and Culture (EAC) and Directorate General for Informatics (DIGIT), among others. The bibliographical research, in secondary sources, included publications books, scientific journals, research projects, papers, theses, and conferences about the topics related to fashion design and online education, collaborative education, digital learning, lifelong learning, theories of education. It started during the exploratory phase and continued in parallel with the subsequent phases of the investigation, to guarantee the updating and relevance of the studies.

Inductive reasoning also guided the exploratory research, conducted to achieve a better understanding of the problem: higher education in fashion design, in online environments, within European Higher Education Area (EHEA). This phase identified and analysed fashion design higher education courses, offered online by accredited higher education institutions in the European Higher Education Area (EHEA), resorting to secondary sources (the online courses). The aim was to identify the syllabus, the structure and content, and modes of delivery of the courses, comparing them through established criteria, which facilitated the understanding of the different perspectives of learning adopted by fashion design in an online environment. In parallel test-questionnaires collected the opinions of professionals in the fashion design sector: employees, self-employed professionals, and managers or owners. The goal was to understand how the interviewees perceived fashion profession in relation to education and learning acquisition.

The deductive reasoning gave the basis for building the learning model (working theoretical framework), and put it into testing, (as a simulation) collect and analyse the results to respond to the research question. So, the deductive reasoning helped to make the three research questions observable, defining indicators or codes, to analyse the evidence encountered. Once again, inductive reasoning helped compare the observable information with the learning principles establishing connections and interpreting the meanings.

1.9 The research design

The research project initiated with an initial literature review that allowed to formulate the goals, the research questions, the methodologies, and all aspects related to the research project design, described in Chapter 1.

The exploratory research, carried out concurrently with the literature research and review, was then deepened to understand the problem and refine the research question, contributing to devise an analysis procedure (Figure 1). The research design adopted a qualitative research approach and focused on organising and employing the methods and tools to develop, implement and test a collaborative online learning model, making it observable, to provide data that was later analysed and confronted with the data collected during the exploratory research, thus responding to the research question. (Campenhoudt et al., 1995; Creswell; Marconi & Lakatos, 2003).

The research design also resorted to the Basic Design Cycle (Van Boeijen et al., 2013) to plan the interacting phases of the research. The analysis stage of the basic design cycle related to the exploratory research about the problem, and comprised the review of the literature, the studies on higher education courses in fashion design within EHEA and the questionnaires with experts in the sector. This stage, adopted a descriptive, explanatory, and interpretive posture to understand the problem in depth and from different perspectives, guiding the decisions for the next phases of the research (Rojon & Saunders, 2012; Saunders et al., 2009).

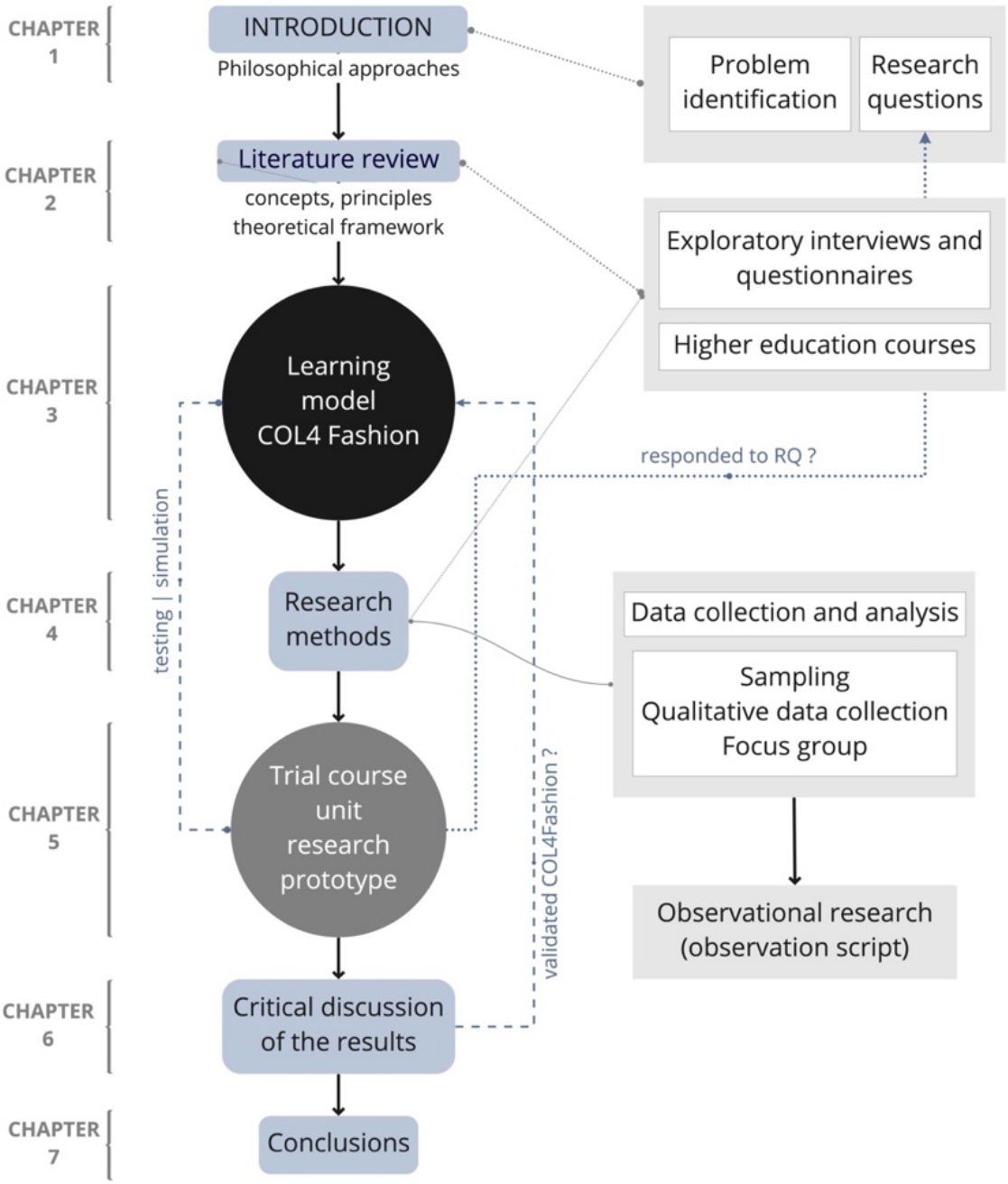


Figure 1 - Research design

One of the major challenges in defining the coverage of the literature review was the complexity of fashion as a field of study, even limiting the primary interest of the research in fashion design higher education. The concept or the word fashion have different meanings, depending on the field of study. Traditionally, and grounded in the sociocultural perspective, fashion refers to the acceptance of clothes and styles for a certain period.

It is also part of a system of massive production and consumption of goods (Aspers & Godart, 2013; Barthes, 1967; Blumer, 1969; Calefato, 2020; Godley, 1997; Inglis & Almila, 2020; Ling et al., 2019; Steffen, 2009).

Although these perspectives underlined the research, they were not enough to understand fashion design, as a cross-disciplinary phenomenon and an innovative area of the economic sector, fashion as a process (Sproles, 1974). Neither they covered the education of fashion design, the set of competences and the knowledge construction process that precedes the use or consumption of clothes. This was the focus of the literature review. Identifying the studies (Bertola, 2018; Conti, 2010; Kawamura, 2018; Nobile et al., 2021; Peters, 2014; Skjold, 2008; Skov & Melchior, 2008; Smal & Lavelle, 2011; Terkildsen & Pilgaard Harsaae, 2020) that emphasised the design activities carried on by fashion designers and how the models of education contribute to their professional development and to the future of the sector.

Therefore, while acknowledging the importance of the Fashion Studies for the knowledge advancement in the fashion sector, fashion criticism, fashion history and theory were not at the focus of the literature search, unless associated with a theory of education and specially if considering technology in learning environments and contexts. The same criterion excluded from the review the works that analysed fashion purely under a socio-cultural, anthropological, psychological, economic, market dimension.

However, as a multi-layered system, fashion posed another level of difficulty for the literature search and selection, because essentially the area of fashion allows investigations ranging from textile and chemical industries to trends forecasting and consumption behaviours, passing through some serious issues on sustainability. So, studies relating to the textile industry or manufacturing clothing, its production, distribution, and consumption processes, as well as any technological, environmental, or human resources related to those, had to be secondary in the literature search.

This did not mean that the procedures for the literature search underappreciated or ignored the complexity of the fashion system with all its interconnectedness, or even that it disregarded fashion related topics in education programs and curriculum. But, to propose alternative models of education that would contribute to the improvement of the entire system of fashion, it was necessary to form a panorama of previous studies relevant for the research. So, the focus remained on the education of fashion design, and in educational theories or practices that could support fashion design education, especially in online, digital, technological settings.

Last, education itself needed further delimitation, since the goal of this research was to identify new models for the higher education, which automatically excluded corporate, workplace or vocational

training, as well as secondary, professional, technical education. Still, they contributed to the review when associated with educational theories and/or collaborative and technology-driven approaches.

An additional challenge was to encounter studies that focused on fashion design education and that escaped from a descriptive account of the pedagogical practices in place, or that maintained these practices while implementing "new technologies" as instruments of the learning environments (Amorim et al., 2010; Casciani et al., 2021; Gu & Liu, 2019; Hoang et al., 2019; Kazlacheva et al., 2018; Lee et al., 2019; Lee et al., 2021; Petrak et al., 2018).

One final challenge of the literature research was to identify and understand, among the vast field of distance education, especially the incorporation of the information and communication technologies, digital and wireless technologies, relevant studies on the approaches, delivery models, resources, platforms that might bring improvements to fashion design education. What became clear during the first analysis of the literature research, was to acknowledge and avoid the interactions between technology, the learner, and the learning environment under instrumentalism, deterministic or substantivism perspectives (Wang, 2011), which would put yet another barrier when studying educational models. Similarly, the literature search considered secondary, studies that placed fashion as a content, or an experiment to display the educational potentialities of a certain technological implementation. Despite the wide array of delivery modes of learning, software, or resources, such as e-learning platforms, massive open online courses (MOOC), mobile learning, learning or social media applications, they were not the main quest of the literature research. The literature search and review focused on studies that considered the specific needs of fashion design education and/or that offered educational theories as a foundation for the technological implementation in learning (Bohemia, 2004; Faerm, 2019; Wang, 2011). A better understanding of the Integrative Literature Review and the Systematic Literature review helped define the procedures for this section. Therefore, an initial search and selection of the literature identified the areas around fashion design education that were important to focus on (Figure 2).

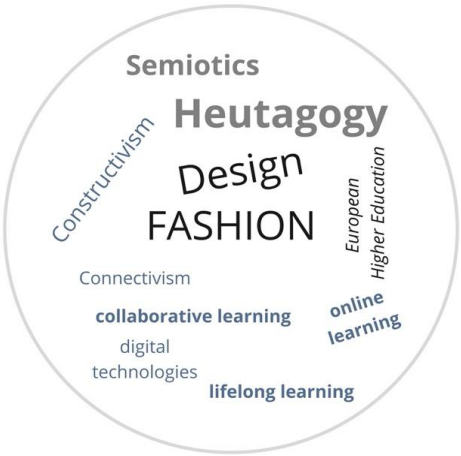


Figure 2 - Word cloud of the Literature Search and Review

> "The integrative literature review can also be used to evaluate the strength of the scientific evidence, identify gaps in current research, identify the need for future research, build a bridge between related areas of work, identify central issues in an area, generate a research question, identify a theoretical or conceptual framework, and explore which research methods have been used successfully." (Russell, 2005, p. 8)

On a second approach, the integrative and systematic procedures of the literature review supported by the research problem and research questions (Figure 3), guided the criteria definition, the collection and evaluation of the studies, and the synthesis of the findings, discussing different perspective and recognising gaps (Bento, 2012; Cooper, 1982; Gaiha et al., 2021; Kitchenham, 2004; Mendes et al., 2008; Petticrew & Roberts, 2008; Sridharan et al., 2008; Thomas et al., 2012).

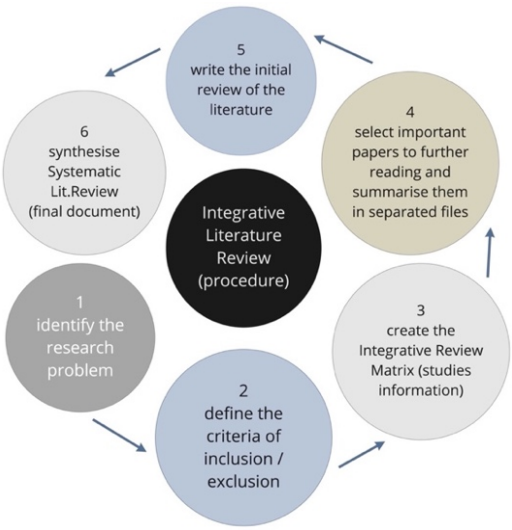


Figure 3 - Integrative and systematic literature review (adapted from Mendes et al., 2008, p. 761).

Although the exploratory research helped to identify and address the problem, guiding the initial approaches towards the research of the literature, the deeper review of previous studies helped refine the research questions and plan the research process. We knew and understood by experience there was a gap between academic learning in fashion design and professional reality within the sector, and that traditional models of education were outdated or did not anticipate the fast pace of the fashion professional sector.

Therefore, higher education in fashion did not or little contribute to the innovation of the sector, except maybe in the textile industry. Another aspect observed by experience was the mismatch of the exit profile of fashion students with the profiles of entry into the labour market, because of the said gap, but also because some fashion companies don't know what competences they will need in the future.

The motivation of this research was to study alternative education processes able to promote a constant update, efficiently, with high quality and affordable to the fashion sector. If fashion professionals work collaboratively, why do they learn individually, as creators, artists? If fashion designers are more and more connected globally, why do they learn confined in fashion ateliers disconnected from the rest of the world, from the suppliers, and other areas of knowledge, kept apart from the industry? Could a robust theory ground the technologies of information and communication, and promote change in the paradigms of fashion design education and therefore promote change in the sector? How collaborative online learning models, more compatible with the contemporary socio-economic context, could help identify future demands of competences of the professionals, to satisfy individual needs for education and the ones of the companies.

Once defined the problem and refined the research scope, the first stage of the literature research resorted to Google Scholar, as a free and accessible searching tool, to perform a broader search, using previously defined parameters. Initially, the research has returned 250 papers that passed through a closer analysis before establishing a final selection. Defining and applying the inclusion/exclusion criterion resulted in 131 final papers, that were scrutinised. A final selection of 31 papers resulted in the first version of the literature review. The systematic literature review continued throughout the research process, resorting to different databases and repositories, as well as indexed journals.

This procedure allowed the organization of the findings in the Chapter 2. Fashion Design Education, demonstrating how they contributed to construct a theoretical framework for fashion design education in collaborative and online environments.

The sections in Chapter 2, will contextualise and discuss design and fashion design in the European higher education sector, considering the global and technological landscape. The first section, 2.1

Fashion + Design, discusses higher education in fashion design, analysing the offer, the education-industry-market (dis)connections and the future of fashion design education. Section 2.2 (Fashion Design, Higher Education) contextualises and presents studies about fashion design education within the technological and immersiveness of the online, digital, e-learning environments. Section 2.3 (Principles for a collaborative and online fashion design education) introduces the education theoretical background of Heutagogy, Semiotics and Design perspectives and section (2.4 The theoretical framework for fashion design higher education) proposes the theoretical framework that will support a collaborative online learning model.

The theoretical framework synthesised the findings from Chapter 2, building the principles for the fashion design learning and the criteria (Van Boeijen et al., 2013) for the collaborative online learning model, its components, and subcomponents The theoretical framework also established epistemological relations between Semiotics, Heutagogy and Design perspectives, that could contribute to the specificities of fashion design and that were essential to sustain the development of the collaborative online learning model for fashion design, presented in Chapter 3. This chapter represents the middle way of the research design and focused on the development and implementation of the collaborative online learning model for fashion design using platforms, resources, and digital systems. It presents and explains the methods used to build its components and subcomponents. COL4FASHION was then a provisional design proposal, a possibility that ought to be tested during the simulation stage as a trial course unit, organised in an online learning environment.

Chapter 4 explains the methodological procedures that preceded and succeeded the implementation of the model. It explains the Internet Mediated Research (IMR), which permeated the methodological choices, since the model was in an online environment. The chapter describes the instruments used in the exploratory research and the procedures adopted in the literature review. It then focuses on the operational methodology used, in Chapter 5, to implement and test the model, and introduces the instruments of data collection and analysis: the sampling method used for the selection of the participants, and a set of qualitative methods of data collection (prototyping methodology, observational research[1], and focus group, held at the end of the trial course unit). This meant that, as a research prototype, the trial course unit was an instrument of the observation period and collected information

1 The observational research defined the instruments of indirect observation, questionnaires and quizzes introduced during and at the end of the model to collect feedback from participants and the instruments of participant observation (synchronous meetings).

to feed it back to the model. Chapter 5 presents two sections. Section 5.1 defined the requirements[2] for the trial course unit, called FDOC. The trial course unit had five parts (Discover, Define, Develop, Demonstrate, Deliver), following the double-diamond design process of the UK Design Council's framework. Each part and the set of digital technology tools, resources, materials, and activities related to the learning components and subcomponents of the model. Section 5.2 presented the procedures for the qualitative analysis of the data, and resorted to the stages of the framework analysis, establishing the analytical matrix that supported the discussion of Chapter 6. The organisation, analysis and interpretation of the results sustained the discussion and helped understand to what extent the model related back to the theoretical framework and the learning principles of the collaborative online learning model, informing potential areas of improvement (evaluation stage). The analysis of the results evaluated the model as a viable alternative to the research problem (decision stage) and thus responding to the research question.

Chapter 7 concluded, supported by the preceding analysis and discussion of the results, responded to the aim of the research, and review the contributions of the research, also presenting possible improvements and pathways for future research.

2 The type of the course unit (a block unit), the tutor and other stakeholders, the syllabus, with the content, learning objectives, learning assessment methods, the resources, workload, delivery method (online).

2. Fashion design education

This chapter presents research on the current literature on fashion design education. It investigates the theoretical approaches that could support collaborative and online opportunities, that presented viable theories to support the implementation of collaborative models of education in fashion design. Similarly, it was important to understand how web-based and digital technologies could promote meaningful and contextualised learning in fashion design, more coherent with the rapid changes in the fashion system and the global reality in the sector. The chapter contains four sections. It starts by explaining the procedures adopted for the literature search and analysis. The next three sections discuss the conceptual dimensions that helped understand fashion design education within the European context and identify studies on educational theories for fashion design, online fashion design education or digital technologies supporting learning environments. The literature review grounded the theoretical framework that then supported the implementation of a collaborative online learning model for fashion design higher education.

2.1 Fashion and design

The literature review assumed a conceptual path starting by contextualising design and fashion design within the socio-economic changes brought by the knowledge-based economy, the conceptual age (Pink, 2006) or the age of access. (Rifkin, 2001). The aim was to explore the immateriality in the processes of creation, production, and consumption, to understand how it will change the required competences of future professionals. This sided the research with a less-material fashion design context (Lipovetsky et al., 2010) and to resort to Semiotics to understand the fashion object by the meaning they carry (comfort, less environmental impact, personalisation, etc) and rethink the role of fashion designers. Furthermore, if new digital/virtual technologies, artificial intelligence, big data, the Internet of things (Burrus, 2021; Sharma et al., 2021) open the possibility to greater immateriality, how will be the fashion system? What competences will fashion designers need to create virtual, personalised looks or digital clothes, to resort to virtual digital technologies and convert immaterial values into meaningful fashion products to the user? If clothes are to be produced on-demand by 3D technologies (Beltramo et al., 2020; Gu & Liu, 2019; Lee et al., 2021; Pires, 2019; Spahiu et al., 2021; Surani et al., 2021) bought via e-social media channels, potentially re-entering in the life cycle, then what will be the fashion designer role in this digital-technology immersive fashion system? What model of education would be more effective to educate fashion designers?

The analysis of 489 papers, books, and reports made clear that now more studies are addressing implementation of these technologies in fashion design education. But although they advocated and contributed for a more holistic and flexible approach to education, the vast majority reinforced pedagogical perspective and the role of higher education in responding to the new sets of 21st century skills brought by the so-called 4th industrial revolution.

The global pandemic of COVID-19, forced different sectors, fashion included, to rethink and adapt their ways of creating, producing, distributing, and communicating fashion goods. However, the education sector, in fashion design, assumed a reactive position, adapting its structures to keep educating to a set of competencies that probably the fashion market will not require. Within the fashion sector and the fashion complex process of creation, production and distribution, the designer, the creator, the innovator will need to be capable of thriving in conceptual, immaterial, ideation dimensions. As decoders, these professionals will recognise, anticipate, and convert the sociocultural and economic reality into future possibilities as products or processes. If "we are living in an immaterial world" and designers are conceptual workers, then they can work free from the materiality of the ateliers, workshops, studios. The design activity can happen in virtual, digital environments. This does not mean that virtual environments will replace physical studios. But the virtual and digital technologies offer designers the means to experiment, to explore aesthetically and functionally before materializing fashion products. Therefore, the interest of the literature review was to explore theories that could support models of education to prepare fashion designers as conceptual thinkers, not only to work in techno-digital-virtual settings, but as prospective-thinkers, capable to innovate for the sector.

2.1.1 Fashion and design, in the European Higher Education Area (EHEA)

"Technological progress makes possible to process, storage, regain and pass the information, in every possible form – verbal, written or visual – unrestricted by distance, time and volume." (Martin Bangemann in Becla, 2012, p. 126).

Although the changes in the global socio-economic and technological context were not the focus of this research, it was important to understand the role played by the education sector, especially within the European Higher Education Area (EHEA), in the process of knowledge acquisition and transfer, as an economic resource and productive factor.

Born from the theory of the Information Society, IS and reinforced by the productive crisis of the 70s, education role in the Knowledge-based Economy (KBE) context, was to create knowledge workers with creative, problem-solving skills to drive innovation. This characterised a post-IS stage in which "self-

learning, self-control systems of the information use and creation" (Becla, 2012, p. 129) the structures and characteristics of education and work. (Zacher, 2015) clarified that terms such information society or digital economy related to the same root of the "knowledge economy", meaning societies that needed to produce knowledge to generate innovation and change. So, as the information society dynamics incorporated technological equipment, software, new platforms and information and communication resources, etc. the role of education was to provide knowledge and skills acquisition as mechanisms for selection, filtering, and analysis of the excessive amount of information available. The role of educational institutions, in partnership with other economic agents, were also to define professional areas' new skills, essential for innovation and entrepreneurship initiatives.

The impact of globalisation on the development, production, distribution and consumption of goods and services, changed the entire process from a linear and sequential model to a flexible and dispersed model worldwide. Bohemia and Harman (2010) argued that the phenomenon of globalisation has promoted the spread of new products and the creation of new markets around the world, forcing companies to operate from a global network perspective, establishing international economic connections and facing new challenges in the cultural, financial and management fields, technological, communicational, etc. In this way, product development, oriented towards a global market, was readapted to a dispersed reality of time/space, production, suppliers, operators, etc. With the technological development additional skill sets surfaced, to meet the integration of dispersed markets, and non-linear models of production, connected under a global network. For Becla (2012, p. 126) this 'new' reality has influenced societies not only in financial, managerial, technological levels but also in cultural, social, communicational, and educational ones. Similarly, globalisation's technological, social, cultural, and economic challenges added a major challenge in the role of the educational sector. (de Souza Borges, 2017; Fiss, 2009; Gale, 2012) Different technical, cultural, and professional settings demanded adjustments on professional competencies, and concepts as innovation, creativity, problem-solving become common requirements. (Bill, 2012; Kačerauskas, 2020) Education adjusted the knowledge acquisition to respond to the set of skills needed from the future, creative professionals and to adjust the ones needed from professionals already integrated into the job market. So, every new set of knowledge and skills required a responsive adaptation of the education sector.

The higher-speed connectivity and dematerialization of the Experience Age changed the type and how to search, storage and sharing of information, adding diverse ways of engagement via "ethnoscapes, mediascapes, technoscapes, financescapes, and ideoscapes" (Arjun Appadurai in Fiss, 2009, p. 4) or fashionscapes. (Calefato, 2021). And then, between March 2020, and July 2021, in a confined Europe,

consumers moved towards online channels, remote working became common, and online learning was adopted in all levels of education. The Covid-19 pandemic, besides changing the working/studying/leisure paradigms, and businesses internal operations, accelerated the adoption for digital technologies and digital products/services, altered the interactions between companies and customers, and developed new behaviours. It also gave rise to (digital) innovations that would only appear in three or four years. A survey conducted by the McKinsey Group with executives and senior managers of different regions, industries, company sizes, and functional specialties[3] (Baig et al., 2020) about the impact of Covid-19 pandemic, indicated that companies and businesses had to implement rapidly adaptations to meet the urgent needs of confined customers. The survey also informed that the remote education failed to adapt and change, negatively impacting students. In the same report the McKinsey group analysed the higher education sector before and after the pandemic and highlighted that the health crisis only enhanced the decline in enrolments, and budget losses. Similarly, Moe and Rajendran (2020) affirmed that, during the crisis, the higher education system failed its customers: the students. Therefore, the authors considered that, in the post-covid scenario, students will be looking for non-academic forms of learning and higher education institutions "will have to digitize or die" (Moe & Rajendran, 2020, Higher Ed: section) When analysing the impact of the Covid-19 pandemic in the United Arab Emirates (UAE) higher education system, Ashour (2021) considered that the education sector needs to rethink its modes of delivery to encompass emerging skills and jobs. Gurukkal (2020) also addressed the contradictions that forced systemic changes in higher education institutions during the pandemic crisis and that will shape further changes in the next years. Besides reviews in the learning processes, outcomes, assessment, and adoption of more cross-disciplinary and self-directed approaches, the author alerted to the increase in faculty replacement by supplementary online providers or renowned guests and young graduates arriving in a recession landscape that will affect work conditions. The author also considered a potential division of HEI:

> "...humanities and social sciences taught informally through virtual mode involving less expense and meant for the general public and the other type covering medicine, pharmacy, nursing, pure sciences, engineering and architecture taught formally through the campus mode involving more expense" (Gurukkal, 2020, pp. 94-95).

3 Data from an online survey, McKinsey Global Survey of executives, conducted online, from July 7 to July 31, 2020, with 899 C-level executives.

Similarly, Eurydice reports on Adult education and Training (Kocanova et al., 2021) and on the European Higher Education Area (European Education Culture Executive Agency Eurydice, 2020, p. 160) questioned the nature of higher education institutions, their learning environment, the funding strategies and policies, the development social skills, the issue of technological access, within digital immersive landscape. So, while the Covid-19 pandemic opened education sector to new forms of learning, it might in a post-pandemic scenario, enhance the division on the quality of learning, in preparing professionals differently for the future work landscape.

> "If Europe should fail in strengthening creativity in higher education, the very goal of a European knowledge society would be at stake."(Creativity in Higher Education Report, issued by the Association of European Universities in 2007 Bill, 2012, p. 6)

The path towards a knowledge-based economy and forward to what is being called as the 4th industrial revolution[4] will be disruptive because it is transforming and will transform industries, sectors, and economies, thus requiring universities to rethink and anticipate the nature of work, the role and relevance of diplomas[5], the set of competences required and how to educate future generations (Hoang et al., 2019; Reaves, 2019). To do that, higher education institutions needed to reinforce their position as centres of research and knowledge production that collaborate with other socioeconomic agents, taking into consideration the diversity in local and regional economies, culture, and people skills. Education, innovation systems (universities, research centres, etc.) and information infrastructure (internet access) are the three main pillars of the knowledge economy, responsible for a healthy workforce, considered employable and capable (OECD)[6].

Under the values that associate technology and productivity (Bill, 2012) education develops the capacity to produce, transfer, apply and manage knowledge to meet a market-oriented society, a "post-industrial society but also post-capitalist where everybody is competing and the most important is knowledge" (Peter F. Druker as cited in Mujic & Mikrut, 2012, p. 416). Science and technological innovations, especially in the ICT sector, transform data into information and the latter into knowledge that will feed

4 In accordance with Professor Klaus Schwab in the book The Fourth Industrial Revolution (2016): the first revolution (steam engine and industrialization), the second (electricity and mass production), and the third (computers, networks, and information technology). Reaves, J. (2019). 21st-century skills and the fourth Industrial Revolution: A critical future role for online education. International Journal on Innovations in Online Education, 3(1).

5 On a 2020 report "Brand academy", about the future of education, the consultancy agency Wunderman Thompson, presented partnership between education institutions and top brands, such as Facebook or Google, to supply an offer more aligned with the educational needs of future generations (Tilley, 2020).

6 OECD. The Directorate for Science, Technology, and Industry (DSTI).

the innovation system. When associated with education, information infrastructure supports a network of institutions, regulations, and procedures, ensuring the production and evaluation of knowledge, aiming at quality and the positive significance for economic and social development. This dynamic is aligned, with a communication from the World Economic Forum Annual Meeting (Jahanian, 2020) which placed higher education as the sector capable to dimmish social and economic gaps if changes are implemented to adopt more dynamic and flexible models, with less detailed learning programs will be easily outdated. However, associating technological progress with sustainable productivity, or the digital revolution with growth and prosperity, and the establishment of information pathways (ICTs) as drivers of the new economic order might lead to "*the intellectual trap of associating more sophisticated technology with the need for higher technical skill levels*" (Bill, 2012, p. 28). The discourse is reinforced by the recommendations of the European Commission, Directorate-general for Education, Youth, Sport and Culture, that the Educational Standards (ESs) must meet Occupational Standards (Occupational Standards OSs) and Qualification Standards (QSs). Nicula (2014) considered this to be one of the greatest challenges of the knowledge society: coordinate the three standards, which depends on the identification and prediction of new (and always renewed) skills, as well as on the constant adaptation of the educational system, to promote (and validate) learning through practice, maintaining the high quality of the process and results. Throughout Europe, professional training programs, inside or outside companies, attempted to meet these standards (Nicula, 2014) with programs aimed to facilitate mobility between education and training systems, as well as to recognise alternative learning experiences (non-formal, in the workplace, etc.), from a Lifelong Learning (LLL) perspective. Although not considering higher education sector, the Eurydice report on adult education and training, overviewed distance learning providers or e-learning platforms and recognised good structures, tools, and initiatives, both at the European and national levels. It stressed the knowledge and skills obsolescence and recognised the importance of distance education in providing flexible, alternative, and informal ways through 3 steps: prior skill assessment, validation, and recognition and a "tailored, flexible and quality learning offer" (Kocanova et al., 2021, p. 95).

It also pointed out modularisation of programs (micro-credentials), and the reinforcement of mechanisms such as ECTS and ECVET (as well as Europass, EQAVET, ESCO) to democratise knowledge, allowing learners to move in and out of education and training and achieve recognised qualifications over longer periods of time, assuring quality levels (European Education Culture Executive Agency Eurydice, 2020, p. 161; Kocanova et al., 2021, pp. 98-101). However, the report also adverted about the restrictions that still existed in adult continuing education, such as low levels of digital skills

or limited access to technology and recommended development of student-centred learning, greater flexibility, and access to funding so that young and adults also have opportunities to thrive in an increasingly demanding job market.

The expectations about work or profession created challenges and new connections between human resources and capitalisation of knowledge and science, between the knowledge learned and the labour market, thus augmenting the pressure on the European education sector (Hermannsson et al., 2019) According to Mujic and Mikrut (2012) the pressure to rethink the role of education and its influence on Europe's socio-economic development shaped the Bologna Process (1999) and brought greater awareness about the need for closer ties between higher education and the labour market. Characterised as a methodological reform in the European Higher Education System (EHES–also considered a Europeanisation of the sector) the goal of the Bologna Process was to increase the competitiveness and internationalisation of European Institutions of Higher Education (EHE), its initiatives and programs (European Area of Higher Education–EHEA[7], the Diploma Supplement, the European Network for Quality Assurance in Higher Education–ENQA[8], and the creation of the three-cycle degree structure). Szolár (2011, pp. 82-83) analysed different perspectives in the literature through which some authors recognised the need for a new strategy to face the growth of higher education globally, to increase the visibility of the European Area of Higher Education (EHEA) and to compete, in the global education market, with North American institutions (Ivy League) deeply oriented towards the labour market, research and development, innovation and new technologies. After a consolidation period, in 2010, the Bologna Process has now 20 years and the Eurydice report (European Education Culture Executive Agency Eurydice, 2020) analysed the barriers (namely the instability of the European Higher Education Area), the advancements on mobility, quality assurance and recognition, and the challenges ahead[9], considering the shift in the digital technologies exacerbated by the Covid-19 pandemic (European Education Culture Executive Agency Eurydice, 2020, p. 3).

"Digitalization plays a role in all areas of society, and we recognize its potential to transform how higher education is delivered and how people learn at different stages of their lives. We call on our higher education institutions to prepare their students and support their teachers to act creatively in a digitalized

7 The European Higher Education Area.

8 European Association for Quality Assurance in Higher Education.

9 The implementation of the Digital Education Action Plan and the European Research Area to work towards a European Knowledge Area.

environment" (Paris Communiqué, p.3 as cited in European Education Culture Executive Agency Eurydice, 2020, p. 160).

Although recognising that the Bologna Process implemented greater recognition and mobility in the EHEA, it also received many criticisms for creating an identity crisis in the European higher education system (Szolár, 2011) and for being oriented according to economic rather than educational strategies (Bill, 2012; Mujic & Mikrut, 2012; Szolár, 2011, p. 94) higher education system under political interests, economic growth, and the labour market needs in a dynamic of "input and output". Bill (2012) for instance, questions the emphasis on creativity, with a small "c", resulting from the vocationalism of the educational system to be more adaptable to the business environment. Individuals became input for production (human capital), aimed at capitalising the knowledge gained as investment, in polytechnic centres, in corporate training or on-the-job experiences. The higher education sector was accused of improper professional practice, valuing theory over practice, not exchanging information with the industry, presenting low flexibility in adapting to the needs of the market (Chmielecki, 2013, p. p.115).The sector also contributed to the low level of preparedness of students and adult professionals forcing them to bear the costs of self-training to keep "up-to-date", making them "responsible" for their level of employability[10]. Investing in education and training meant investing in increasing production and innovation. Nevertheless, the number of tertiary students in the EHEA increased over 18.2 million between 2000 and 2017[11] (data from the academic year 2016/17, (European Education Culture Executive Agency Eurydice, 2020, pp. 18-19) and the number of higher education institutions increased[12] from 3009 institutions in 1999/2000 to 3537 in 2018/19 (European Education Culture Executive Agency Eurydice, 2020, p. 25).

So, if the complex questions of the future will require creative, forward-looking professionals prepared to question and reframe problems, to assume the responsibility for their own learning, (Ashour, 2021; Van Laar et al., 2017) and cope with the insecurity and uncertainty of the working landscape, what will be the role of the European higher education sector? How will it educate envisioning competencies

10 The "set of achievements, skills, understandings and personal attributes that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy." Majewski (2013, p.181)

11 Total number of students enrolled in tertiary education in EHEA 38.1 million, 60% being from Russia, Turkey, Germany, France, and the United Kingdom.

12 In France 387 new institutions in 2018/19, namely in business and art schools (Écoles Supérieures d'art et de Culture); 138 in Italy and 132 in Germany, mostly in the private sector.

(knowledge and skills) yet to come? How to educate focusing more on creativity, on "how to learn rather than what to learn"? (Dell Technologies, 2018, p. 3).

Zacher (2015) emphasised the need to adopt a more holistic and contextualised (less westernised) approach to the knowledge society, in which education, together with other social and economic factors, happens throughout the life of individuals offering flexible pathways[13] for the existing and future workforce (Jahanian, 2020). Majewski (2013) reinforced the need to create different pathways, taking advantage of technological development (ICTs, MOOCs) and using strategies that were already implemented to improve interactions, assessment, and the quality of the adult learning outcomes (active Erasmus+ program 2021-2027, and inactive Grundtvig program), since "today's educational curricula, career and training programs, assessments, degrees, and certifications could become largely irrelevant to the challenge of creating value and earning income in a constantly evolving market."(Reaves, 2019, 4. THE FUTURE OF WORK section). Corallo et al. (2010) considered that distance education could benefit from technological platforms, systems, and tools to strengthen its credibility, through quality systems and validation of results, to provide more personalised learning experiences, more focused on the individual and on the learning in a long run.

The ICTs at the service of distance education contributed to the information flow, to disseminate different points of view, sharing of knowledge and the acquisition (and updating) of skills to be more coherent and interrelated with the job market. Distance education, enhanced by the incorporation of ICTs, reached individuals who did not have easy access to education (Kovach & Montgomery, 2010). Technological advances helped distance education to broke geographical distances, time limits and social restrictions, yet it still needed to provide quality guarantees, validation systems and articulated and contextualised curriculum.

Still, more importance was on results, that were incorporated in the job market, then on the quality of the learning process (Szolár, 2011). Education needs to prepare individuals for the different aspects of human life, (Majewski, 2013) including for work and, therefore, learning must establish the union between acquired knowledge and skills and its implementations in scenarios that has not formed yet. The impermanent aspect of work and profession, in the changing environment of the labour market in

13 For instance, the Carnegie Mellon University T-shaped approach: vertical (deep disciplinary) expertise is combined with horizontal (cross-cutting) knowledge. (Jahanian, 2020)

a digital environment, will require what has been defined as the 21st-century skills[14], which relates to broader concepts than digital skills, and entails critical thinking capabilities[15] (Blaschke, 2021; Jahanian, 2020; Safian-Demers, 2021; Van Laar et al., 2017). This requires that educational policies present broader approaches, strategies, structures, incentives, and a broader set of validated learning experiences (organised in different models), to provide individuals with a set of 21st-century skills necessary throughout their life cycle. Lourenço (2007, p. 29) considered it imperative to design new methodological approaches for teaching and learning in higher education, to prepare students to transfer the knowledge to different contexts and challenges throughout life, intensifying cognitive activity and promoting creativity and innovation.

However, Chmielecki (2013); Lehner and Wurzenberger (2013); Lourenço (2007); Majewski (2013) expose the difficulties in adapting higher education (curriculum, structure, team, etc.) to continuous changes and innovations at a socioeconomic level. The difficult transition between educational systems and the labour market arises from the discomfort of bringing together the formal education, still based on a classic model of knowledge transmission, which focuses on research autonomy, the isolation of teaching staff and the labour market, guided by a post-industrial, technologically immersed economy and an integrated and articulated approach to knowledge. On the other hand, the information overload and high levels of competitiveness increased the depreciation of knowledge, massified and easily incorporated into the job market and triggered a reductionist perception of higher education, as a "commodity sold to the student-customer" (Chmielecki, 2013, p. 118) that generates the knowledge and innovation necessary for the development of society and economic growth Lehner and Wurzenberger (2013) resorted to the analysis of the relationship between access to information and knowledge acquisition, from philosopher Konrad Paul Liessmann, to reflect on the role of universities and their agents in a knowledge-based oriented society. Szolár (2011) also discussed the institutions (university or non-university) orientation, more academic or professional, and how this influences the curriculum, programs, continuing learning, the comparison between academic degrees and certificates (as well as their relevance in the business market). The author presented different perspectives in which the first cycle of higher education should be a generalist and comprehensive, oriented towards

14 21st-century skills: flexibility, adaptability, observation, empathy, creativity, innovation, learning how to learn.

15 framework of seven core skills: technical, information management, communication, collaboration, creativity, critical thinking, and problem solving, and five contextual skills: ethical awareness, cultural awareness, flexibility, self-direction and lifelong learning. (Van Laar et al., 2017)

professional knowledge, aiming at entering the labour market, but also leaving a basis for future studies. But even when inserted in the labour market individuals should be able to find initiatives that promote the updating of learning through programs aimed at training for future professional perspectives, or for academic research (Majewski, 2013). This would allow the individual to return at distinct moments of life, with their professional experience and skills recognised, with accessibility and financing structures and flexible learning paths that include study, family, and professional life. Chmielecki (2013, p. 115) considered the labour market as the recipient of the education system but also recognised the importance of individuals to develop intellectually while transferring, transforming, adapting the acquired knowledge into marketable skills. According to the author, this exchange can be structured to maintain academic autonomy, while increasing mobility and professional sustainability, promoting qualification, and encouraging continued learning, valuing the entrepreneurial spirit, and establishing a social dialogue that contributes to development and innovation, with the goal of improving human life. Overall, these authors considered it necessary a closer partnership between higher education and the market sectors, reducing the inconsistencies between the knowledge learned and that necessary for the labour market. Thus, it is essential to rethink the role of higher education institutions, as well as work on some structural problems, such as the inflexibility of labour policies, to focus on the expectations of individuals and their right to live a full existence in the personal and professional fields.

2.1.2 Fashion and design within the technological immersiveness

This research understands fashion design education in the theoretical based design, adopted by the Ulm school of design and that strengthened the "connections among design, sciences, and technical skills" (Ghajargar & Bardzell, 2019, p. 290) and fostered design research and education to move "beyond apprenticeship and technical training" (Cross, 2018, p. 706) Under this broadened perspective, this research encountered comfort in working with semiotics and systems thinking to develop an educational framework for fashion design that could also align with Heutagogy and constructivist principles.

> "If 'form' is the opposite of 'matter', then no design exists that could be called 'material'. [...] Design, like all cultural expressions, illustrates that matter does not appear (is not apparent) except insofar as one in-forms it, and that, once in-formed, it starts to appear (become a phenomenon). Thus, matter in design, as everywhere in culture, is the way in which forms appear" (Hanke, 2016, p. 17)

The definition presented above entails Vilém Flusser's philosophical framework about design's imaginative aspect (Ferreira, 2011) that predicts something not yet existing and imagines distinct possibilities when observing a problem. For Flusser, as for Umberto Eco, design relates to signs, as a stratagem that reconfigures nature into culture through technology (Hanke, 2016, pp. 7-8). Design, is then, transforming nature into culture. Flusser's understanding of design as a cultural artifice, which astuteness lies in creating objects that will mediate all human relations, making us artists, freely living in an artificial world transformed by us and for us: "a new human being, who is not concerned with things, but with information, symbols, codes and models", as highlighted by Ferreira (2011, pp. 153-155). The design role is essentially to imagine solutions and resolve ill-defined problems (Cross, 2018; Folkmann, 2010b) to employ divergent and convergent thinking to propose different, non-existent and improved reality. Folkmann (2010b) investigates imagination in the dichotomic relations between the conceptual and material, between what is unknown and known in the design process. He also emphasises that a better awareness about "the mechanisms of imagination, (...) contributes to our ways of constructing meaning and we can create and use design as a medium for this process" (Folkmann, 2010b, p. 7). To create connections between the immateriality and the materiality, designers work with observation and (re)interpretation of the reality and envisioning a better, an improved reality - "imaging is a doing" which "alludes to the thinkable, and this means: to the do-able" (Folkmann, 2010b, p. 1) in a process that Peirce would also assume as imaginative, or a process of perceiving and interpreting the world (Lawson & Dorst, 2009). Barrena (2013) emphasised that, for Peirce, knowledge is built upon interpreting the observed reality, generating, or imagining new ideas and creating new meanings, in an endless signification process that will then guide human actions.

The design process integrates creativity and analysis thinking and skills, multiple areas of knowledge, different materials and methods, and economic, sociocultural, technological, and environmental factors, that work complementarily to develop creative solutions and improve the quality of human life, contribute to society, to the environment.

Krippendorff's constructivism understands design as a "circular process of perception and action or of conceiving and making things". Key to the constructivist approach, design is not an objective reality but a dynamic way to understand it. "We might approach a new product with curiosity but always handle it as a variation from what we already know and what we want it to be".(Krippendorff, 1992, p. 26).

Krippendorff's (1992, 2005) constructivist semantics for semiotics, places individuals in the centre of the understanding, "a recursive process of constructing (deconstructing, reconstructing and inventing)" (Krippendorff, 1992, p. 34), or the "driving activity of a post-industrial society where digital tools become

prostheses of human intelligence" (Postlethwaite, 2020, p. 7). So, in the constructed negotiation between design-environment, the 'design sensibility' (Pink, 2006) or a holistic, synthesis capability is essential. Similarly, Holt (2017) considers the semiotic perspective essential to understand the complex, dynamic and interactional relations between "the incessant feedback loop between the morphological and semantic levels (between the plane of expression and the plane of content) (Holt, 2017, p. s336). As Maldonado stated (1961):

> "design is a creative activity that consists in determining the formal properties of objects that we want to produce industrially. By the properties of the objects, one should not comprehend solely the external characteristics, but especially the structural relationships that make an object or a system of objects a coherent unit, both from the point of view of the producer and the consumer." (Maldonado, 1961, in ICSID, Conseil International des Sociétés de Design Industriel, currently WDOTM, World Design Organization)

Design, as a problem-solving process, is one perspective of the design nature. It is also epistemologically constructivist, and its nature is a constant process of learning, on trying to understand the nature of the design problem while imagining, experimenting design solutions (Folkmann, 2010a, 2010b; Lawson & Dorst, 2009) Each project entails a design problem and "it is the nature of the problem only to evolve during the design process." (Folkmann, 2010b, p. 31). For each project and each design area, the materials and technologies, the nature of the product will require a necessary set of specialised knowledge and will condition the design process. Therefore, understanding through design theory means learning in flexible and contextualised ways as the project develops.

One constant aspect of the design process is the human creative presence to assemble and manipulate materials, dimensions and volumes and get the desired results (Pink, 2006). The design whole-minded aptitude, which entails both L-directed and R-directed thinking, respectively an analytic, rational, detail-focused, convergent thinking and artistry, innovative, divergent type of understanding, which allows the construction of relational configurations, or Gestaltists relations (Pink, 2006). So, how to structure the education in design in a reality established by conceptual values, by rapid information flow and technological immersiveness? Although there has been a substantial number of studies experimenting with ICTs in the design education (Amro, 2021; Egan & Crotty, 2020; Fleischmann, 2020a) most of them studied digital modes of delivery, translating the physical classroom to the online environment, or the incorporation of new technologies to support the learning process, while maintaining a pedagogical approach to higher education. Still, they contributed to discuss the possibilities for the design education within digital, online environments.

Menaouer et al. (2013) proposed to combine the Competence Approach with new educational technologies to promote learning experiences focused in the global and complex realities of the work market. Based on the systems theory and the Global Society (GS) theory, Lehner and Wurzenberger (2013) proposed the Global Education model (GE), that emphasizes the interrelations of different social and cultural contexts in educational programs. The Cosmopolitan Approach (Coryell et al., 2014) envisioned education internationally, to form global citizens, through transcultural, contextualized programs formed around communities, in accordance with the theory of Situated Learning (Coryell et al., 2014). Those approaches emphasised the need for contextualized, adaptable, and flexible programs and environments, organized to meet the different needs for knowledge and competences.

Fleischmann (2019, 2020a, 2020b) for instance, contributed with different studies and reviewed different approaches to the virtual, blended learning alternative for the design studio pedagogy. The author considered that overall students acknowledged positive aspects, such as flexibility of watching the lessons when they had time, enhanced self-management capabilities, but she identified the demotivation felt by students in the final weeks of the course, due to a lack of interaction with the lecturer. The redesign of the trial incorporated opportunities for students presenting doubts and an online test. Although supported by a pedagogical approach, as the learning components were mainly defined by the teacher, Fleischmann's studies demonstrated that the blended learning mode of delivery did not diminish the quality of the outcomes. The author concluded that it was important to continuing exploring blended learning experiences, as they "can provide flexible learning opportunities by including an online component in a blended learning context" (Fleischmann, 2020a, p. 23). In another study, Fleischmann (2020b) challenged once again the studio-based pedagogy when design education relocated to the online environment during the pandemic lockdowns in 2020. The author presented a survey with students of bachelors and master's in design in which students acknowledged more collaboration and feedback opportunities during the online classes, but identified technical difficulties and missed the social component, important in the learning process. The design-based studio pedagogy had been defied as early as the 1970's when Nigel Cross worked with UK Open University's Chair of Design, Chris Jones, to re-invent design education and establish it "at a distance, through the media of TV, radio and print, and in a context of general, mass education, rather than the selective, profession-orientated, studio-based education of traditional design schools." (Cross, 2018, p. 696). Cross argued that design values, the 'designerly ways of knowing' was relevant not only for general education, but as the foundations for research of design as a discipline (Cross, 2018, p. 699). Amorim et al. (2010) analysed how the technological advancements required a restructuring and reorganisation of the design

education, the spaces, methodology and resources, didactics for processing and transmitting information, and more focus on the interactivity and on the quality of the learning process. Esparragoza and Devon (2005) had already proposed that design practice and education should envision in their programs the study of hyper-connected and multicultural scenarios, offering pathways that will prepare designers to develop meaningful solutions, adapted to ever-changing challenges. Wang (2011) considered that design education, more directed to multicultural, teamwork (interaction), project-based, creative, and collaborative learning can escape traditional education paradigms benefiting from technological environments, geographically and timely unrestricted. Accordingly with Fleischmann (2020a, 2020b) those conditions are at the heart of a decentralised workforce encountered in the design profession.

Technology fast changes are affecting the social structure and values, individuals' lifestyles, consumption, work, and education. Besides that, global changes in demographics (an increase of 35% in the age group of +65), in the job market (instability, constant need for professional improvement, career shifts) and disruptive digital technologies, accessible through mobile devices and immersive environments[16] (i.e., Wunderman Thompson Insight series about the Metaverse) will require more student-centred, flexible, engaged, and interactive learning experiences in the higher education sector. Some examples are game-based and simulation-based learning, augmented reality (contextualisation), virtual reality (immersiveness, personalisation), m-learning, cognitive learning, micro-learning, high-velocity training, training through problem-discovery.

In the past, guided by an industrial model, fashion courses prepared learners with skills and knowledge (drawing, sewing, cutting, modelling, etc.) to be absorbed by local or regional clothing production companies. Changes in the global economic landscape spread the production globally, making those competences obsolete, and forced education in fashion to adapt its programs to respond to the new demands of the global working environment of the information economy. The working environment kept changing, as digital technologies, global economic instability and environmental crisis affected the production and distribution models (i.e., fast fashion and later slow fashion) of the sector (Bertola, 2018; Bill, 2008; Faerm, 2014b, 2019; Inglis & Almila, 2020; Ling et al., 2019; Lipovetsky et al., 2010; Sala,

16 Such as the Metaverse concept. Although Facebook company recently changed the name to Meta, anticipating the new ways of social engagement, the term originated in Neal Stephenson's science fiction novel "Snow Crash" (1992). Metaverse designates a 3D immersive environment, where users engage with each other using avatars (a character, a representation of the person).

2016; Skov & Melchior, 2008). The Covid-19 pandemic only highlighted the problems in the fashion sector (related, for instance, with work conditions, environmental impact, diversity, and inclusivity), and reinforced the need for a more holistic approach to fashion education, that (re)considers fashion designers' role in society and for the sector's future (Amed, 2021).

2.1.3 Fashion design under the semiotic perspective

To Jakobson (2010) "any garment responds to definitely utilitarian requirements and at the same time exhibits various semiotic properties." (Jakobson, 2010, p. 703). Bill (2012) considered that role of the fashion designer is to create a bridge between the physical characteristics of clothing, its social meaning and the consumer's image. The author resorts to Marx's theory regarding immaterial work and abstract knowledge, considered as the main production force in the Knowledge Economy, to present examples in which the designer's work (knowledge workers) invests the merchandise with meaning, provoking emotional responses in consumers.

Fashion design navigates not only in the materiality dimension (of textiles, textures, shapes, patterns) but also in the symbolic dimension, between the cultural and the imaginary. Fashion detects, captures, analyses, deconstructs images[17], cultural codes, lifestyles, and interpret those signs to consumers, trying to captivate their senses and to converge the designer's imagination with that of the consumer as a message, a language and or as a new system of signs. Therefore, the fashion design process interprets social signs, relating the phenomena in contemporary societies and market information, and converting them into conceptual mood boards, drawings, colours, cuttings, shapes, and product lines, those also being a whole structure of new signs that also form a specific 'message of fashion'. Similarly, Lawson and Dorst (2009) explained that design problems are inevitably under-determined and need to be interpreted by the designer and this "interpretation is itself part of the creative act of designing" (Lawson & Dorst, 2009, p. 42). In this sense, fashion designers work within a "signification process", that relies on their interpretation of codes and signs to create, through a specific set of media (clothes), a multi-sensorial experience, that sometimes becomes part of the purpose or even its primary goal. Semiotics are an analytical tool for fashion brands communicate the immaterial level, that goes beyond the formality of products and that creates emotional links with wearers. This immateriality, expressed by

17 Images as an icon, (Peirce's second trichotomy) are representatives of something else that is not present and that relates to the object represented according to rules in a work of art, a movie, or in a piece of clothing. Buchler (2012).

emotion, experiences, culture, history of the brand are then synthesised in fashion design products that represent lifestyles, or signs/codes through which we relate to the world and each other (Pink, 2006; Robic et al., 2012).

A semiotic approach enhances design's (trans)formative ability to materialize significances, bringing expectations to life and fashion design's communicative and meaning-making aspect. Therefore, as a sign system and entangled in the "maps of meaning" (Hall, 1980, p. 169) of social and cultural contexts, fashion design is not purely a creative process (that imposes the designer's view) but an encoding (proposes codes) and decoding (deconstructs codes) one. It entails not only identifying what has meaning but the acknowledgement that meaning making is part of a dynamic system (of codes) underlying the production of continuous meanings within a culture. Furthermore, reading the messages produced by a social dynamic coded system presupposes prior knowledge of those same codes acquired by experience, according to Folkmann (2010a). Previously acquired knowledge will allow the encoding and decoding process, through which the fashion designer identifies the explicit or inexplicit codes (and their evolution), understands them, interprets them, adds new ones. Robic et al. (2012, p. 79) also reiterated Flusser's understanding of the importance of the knowledge of previously established codes, without which no signs would be decipherable. Folkmann (2010a) investigated, precisely, the role that the 'known and the unknown' plays in the designer conceptual-material process and how this flow can be traceable in their practice and objects.

Thus, the encoding/decoding process[18] emphasizes the importance of the context, the knowledge gained by experience and observation, that allows the recognition and interpretation of codes, and a common understanding between the designer and the user. When presenting a model for mass communication, Hall (1980) gives significant importance both to the decoder and to the encoder roles, and to their level of reciprocity or shared parameters, since "encoding will have the effect of constructing some of the limits and parameters within which decodings will operate" (Hall, 1980, p. 170). With fashion, it is true, though, that styles might be used differently from their original, designed purpose - an effect of social contingency. But although this might seem a lack of reciprocity among the designer, the brand, and their consumers, it is an expected and desired effect, that consumers adopt a style following their wishes, decoding them differently from the original encoded meaning. Those

18In this sense, it is valid to highlight Jakobson's (1971) structuralist point-of-view about the importance of social factors or 'conventions' in the communicative process.

(re)interpretations might inspire the designer once again, who will decode and later encoded by the consumer. The (fashion) design products rely on the feedback, interaction, participation, and reinterpretation of its users. In this sense, the fashion creation-adoption process is semiotic and constructivist, articulating encoding and decoding parameters, and negotiated under social circumstances or contexts (Ross, 2011; Van Leeuwen, 2005). Bill (2008) also indicates how co-creation entails deeper participation from the user in the production and creation of goods and in the development of communities around a brand, a product or the consumption experience itself. This presupposes a negotiated relation between the creator and the user, and an affective and emotional relation with "the doing". Holt (2017, p. s337) presented the importance of the environmental interaction, which the user rearranges the primary configuration of a design object and highlights three levels, or design meta-functions of meaning: representational or symbolic, interactional, and organisational, or "the manner in which meaning is derived by the configuration of phenomena" Holt (2017, p. s337). Following Holt's analysis, fashion can be categorised as "milieus that modify themselves" (Holt, 2017, p. s339). In fashion's acceptance and diffusion stages[19], new meanings arise by multiple reconfigurations of the initial creations and arrangements.

If fashion design is understood as a process through which clothes (as an ensemble of materials and elements) gain meaning, then fashion designers must dominate not only the materiality of the problem, its processes and methods, but they must also acknowledge the role that imagination and the immaterial will play in producing meaningful fashion proposals and that will be later (re)interpreted by the wearer (Dolbec & Fischer, 2015), which ultimately may instigate designers observation into developing new proposals. As an interpreter, fashion designers should be able to manipulate this wide system of signs, composed of an array of elements to provide them significance, by giving them form[20] (Hanke, 2016). In its creative process, fashion designers observe, identify, gather, decode, and interpret the sociocultural context (e.g., trends) into new designs that will be (re)interpreted by individuals and social groups. Wouldn't then be possible to consider fashion designers interpreters of signs? Doesn't the designer's activity presuppose not only the establishment of diverse relations between the structural elements but mostly making sense of them, in an active and unceasing process of interpretation?

19Based on the classical concept of fashion products lifecycle, mainly composed by five stages in the market: product development, introduction, growth, maturity, and decline.

20In-form, related to non-things, that "flood our environment", "immaterial information", "word in-formation", 'form in' things, formulated by Vilém Flusser as (Hanke, 2016, pp. 17-20).

Wouldn't be the designer's role to understand how social and cultural codes guide consumers lifestyles[21], behaviours and perceptions? So, how to educate fashion designers as reflective and thinkers to recognise and thrive in the immateriality of the techno-digital-virtual reality? How can the Semiotics perspective support the development of a theoretical framework for education in fashion design?

2.2 Fashion design higher education

As previously analysed, fashion design professionals develop aesthetic and practical competences, balancing creativity, and originality, with a highly competitive, innovation-driven market. Formed by specialised teams, globally scattered, who develop the fashion activity collectively, resorting to knowledge and information available in technological environments, platforms, and applications.

The complexity and multidisciplinarity of the fashion sector and the very nature of the concepts of the fashion field, grounded in cultural, economic, anthropological, psychological, or other perspectives (Skov & Melchior, 2008) made the search and analyse of studies in fashion design education a complex task as well. There were few studies on fashion design education in relation to the changes during the XX and XXI centuries (de Fátima Sanches & da Silva Hatadani, 2014; de Martinez & Navalon; Harvey et al., 2019; Marques et al., 2018; Onur, 2020; Skjold, 2008; White, 2019). Nevertheless, authors were unanimous in differ the socioeconomic scenario and the fashion design practice, its creative, productive and distribution processes, and fashion design education, as the main reinforcer of the design philosophy of the "quantity-focused" production (Onur, 2020, p. 60). Education in general and in fashion design remained with a XIX century focus, responding to the industrial revolution, to capitalism and expansionist needs, to the market demands, with a rigid system based on departments, standardized tests, and quantitative measurements of learning outcomes. Onur (2020) studied more sustainable practices while educating students from an undergraduate level course in "Accessories Design" in Turkey and analysed the role of design education in generate "social change, stimulate collective production, and question the notion of novelty" (Onur, 2020, pp. 55-56).

Different studies helped understand the antagonism between the educational (pedagogical) approaches, in which fashion focused on creative practice (clothing as cultural construction and symbolic) and the logic of the economy and market (clothing as a commodity), which reinforced the incongruity between

21Although Bourdieu analysed the production of cultural capital from a hegemonic view, legitimated by a higher culture from which the creator was the representative, in this paper it seemed appropriated include the author's perspective of habitus (or lifestyle) as the way someone lives in the world, behaves, make choices.

the creative capacities stimulated by fashion education, the expectations of future professionals and the business needs/industrial[22]. Bertola (2018) presented recommendations for a more flexible, multidisciplinary, learner centred fashion design education, focused on problem solving and soft skills acquisition. Bohemia and Harman (2010) considered that changes in process (i.e., simultaneous engineering, led by cross-functional teams in a collaborative and shared environment) and in distribution (agile production, more flexible and user-centred) required a change in the design profession and consequently a change in design education. The authors agreed that a new set of competences (knowledge and skills) were essential for design professionals to operate in the complex reality of the creative economy (Choi et al., 2019; Kačerauskas, 2020) to face the diversity of languages, cultures, markets, and economic political systems. But the new set of professional competences (innovative-thinking, adaptability, flexibility, creativity, and problem-solving) required rethinking the role of fashion designers and thus rethink education in the fashion sector (Bill, 2008). Onur (2020) also reinforced that the education system is the main obstacle for educating for sustainable design and resorted to Victor Papanek's "Design for the Real World" perspective, to explain how a limited vision of design as the act of giving form to materials, disregarded the natural or cultural systems. The analysis of these authors demonstrated that the level of impact of education in fashion design in sectors that go beyond the production and consumption of clothing, and the imperative need to study new educational models that contribute comprehensively to society and economies.

Fashion design's intrinsic ability of self-destruct, deny and reconstruct, to be reborn countless times, represents a challenging field of research, which requires new studies, especially focused on the dynamics of teaching/learning/training, confronting it with the new technological reality, to promote a closer relationship with the market. Amorim et al. (2010) indicated the need for more studies in instructional design, especially in the development of pedagogical resources, educational software, hypermedia, virtual teaching and learning environments, learning objects. The authors alerted to the importance of graphic design in their development, to ensure effective communication between stakeholders and in the virtual environment itself.

Wang (2011) argued that currently (and in the future) students will be used to digital virtual technologies, which will make their interaction and collaboration in digital learning environments more natural. The

22 Bill (2009) argued that this dualism emerged in the 1990s with the association of symbolic values to goods (Baudrillard, 1981) in the mist of the cultural economy.

author discussed the education of architects and engineers in design schools and how the culture of these environments favours creativity, collaborative relationships, social relevance, and the rapid communication of ideas (Wang, 2011, p. 188). Wang (2011) also resorted to the TCPK theory (technology, content, pedagogy, and knowledge), whose model does not isolate technology, but inserts it contexts, considering its educational dimension and making it an interactive partner.

Aligned with Lawson and Dorst (2009) perspective of design as learning, articulated with Donald Schön's[23] analysis of reflective practice, that promotes learning while framing the problem and moving towards a solution, and with the constructivism of John Dewey[24], the aim of education must be to build knowledge at the cognitive and behavioural level, through experience and student-centred, with the teacher is an advisor.

Despite fashion figuring among the biggest eCommerce segments worldwide, with an active and interactive presence of fashion consumers and brands, professionals and students, the online, mobile, digital, innovative offer in fashion design higher education in Europe was limited, non-existent or the ones existent are merely transpositions of the traditional 'onsite', lecture-based education models. Furthermore, if we consider the job market instability, the responsive strategy adopted by higher education sector, and the time fashion designers take to graduate, the odds are that the competences acquired will be outdated by the time they reach the market. In this context, the traditional model of knowledge acquisition, structured in a pre-defined curriculum that focuses on content relevant only for specific situations, cannot foster innovation and entrepreneurial initiatives. Considering fashion design as the learning subject aimed to develop students' design capabilities in the practice of developing fashion products, then fashion design education needs to prepare learners to design, considering the technological and socioeconomic changes, and thus adopting a prospective approach for the sector.

Learning technology products and services can enhance the transmission of information and skills (knowledge transfer) and the ability to transfer them to real, contextualized settings (learning transfer). There is a continuous resistance to consider alternative pathways for fashion design higher education, especially in online, collaborative, innovative, digitally immersed settings. This resistance holds on the traditional roles of the fashion designer as an isolated, gifted creator, on the atelier-based practice, on traditional ways of creating, manufacturing, and selling fashion, on the traditional methods of

23 Knowing-in-action/reflecting-in-action.

24 Wang (2011) is aligned with David Kolb's experimental learning theory (ELT).

communicating and interacting with the fashion consumer. New generation of fashion designers will research and interact with their sector in a different manner, so they will need new ways of learning.

2.3 Fashion design online higher education

Under a technologically immersive context, it was necessary to rethink education in many professional fields of knowledge. Non-traditional models of consuming fashion will demand new models of designing fashion, and new systems for fashion retail. It will require new models of fashion design education. If fashion design higher education is equally immersed in the complex, global system of fashion, then what kind of fashion design education model can better the professionals for the future of the sector. And if fashion consumers, fashion designers and fashion learners navigate in the same technology-guided, global, and fast-changing fashion system, then it was to understand the more flexible possibilities for fashion design higher education.

Fashion design requires aesthetic and practical skills from a diversified range of disciplines that balance creativity with managerial competences, innovation and understanding of production and distribution processes, consumer behaviour and market reality. Therefore, there is a need for different approaches for higher education in fashion design, that includes collaborative, online (or hybridised) environments and digital or virtual technologies. But, in a previous study that confronted data collected about the changes in the next five to ten years with data about fashion design higher education in Europe, the education sector was missing the technological ubiquity and mobility, the flexibility and collaborative scenarios that defy traditional learning models, the focus on innovation and personalisation of learning, the mixed role of the designer-consumer-learner altogether.

The exploratory research[25] analysed the discipline of fashion design in online and on-site higher education courses, provided by Higher Education Institutions (HEI), within the EHEA (European Higher Education Area). The study considered fashion design as the learning subject aimed to develop students the design capabilities to develop fashion products. The findings indicated that the discipline, as defined, was absent from the online courses studied. It was the perspective of that study that it is possible to learn fashion design in a collaborative online environment. The study reinforced the need of investigating further the online lifelong learning as a flexible and valid solution for establishing meaningful pathways

25 The study analysed, in online and on-site courses, the overall presence of 'fashion design' in the curriculum, its content and specified ECTs (European Credit Transfer and Accumulation System), as well as its learning outcomes.

and new capabilities for fashion designers. Free from the time and space constraints, online learning can stimulate autonomy and reflectiveness, connect with fashion's fast-pace, and contribute to the advancement of sustainability strategies in the fashion sector.

The European Commission for Education and training framed the new technologies as important tools to improve practices and resources to the new digital realities. Although this discourse is debatable, more demand for digital skills and competences, the political underlying, was not in focus in the research. The Covid-19 pandemic demonstrated the technological presence in every field of life and reinforced its immersiveness in the Education sector. Technological presence became inevitable and to make the best use of it in educational settings, it is necessary to investigate the most beneficial form of using it. Still after Covid-19 pandemic, traditional education system is overall reluctant in implementing new models of learning, collaborative, digital and virtual environments, that stimulate open creation of knowledge, alternative ways of assessing and validate it, and construction of learning communities that surpass the physical classrooms or the physical frontiers. According to Lehner and Wurzenberger (2013) the reduction of spatial distance in the communication context and the modification of temporal perception caused the dispersion of more information in less time, without effective educational strategies to process, select and certify the information flow - such a scenario required a change of paradigms in education at all levels, as became evident during the lock down period imposed by the pandemic outbreak.

The mere adoption of the newest educational technology, either dealing with the device, the service or the delivery method cannot guarantee students' preparedness for demands of the fashion design profession. It was extremely important, then, to investigate educational frameworks from which the technological implementation could be structured for the education of the fashion design sector.

Narayan and Herrington (2014; 2018, 2019) proposed design principles, supported by heutagogical principles and pedagogy 2.0, to be delivered by social media and MLearning, illustrating how self-determined learning can be fostered in online environments. "The ubiquitous nature of mobile devices empowers the user with the ability to interact with different contexts over a time continuum (...)" (Narayan & Herrington, 2014, p. 150). Reddy (2016) studied the heutagogical possibilities for Fashion Design Education so that curriculum and programs could be improved. To do so, the author analysed web 2.0 technologies adoption and social media usage, since they could contribute to self-determined learning. The author also investigated the understanding of the heutagogical learning by Fashion Design students and faculty at the National Institute of Fashion Technology (NIFT). The author studied

institutional programs, under seven significant heutagogical attributes and the author marked that Fashion education presented considerable opportunities to incorporate heutagogical learning.

In a demanding, ever-changing world, self-determined people represent a reflective professional, able to be creative, flexible, and adaptable. The self-determined learner is prompt to explore as well as create contextualized content, connect, and share meaningful information, knowledge, and skills. "With its dual focus on competencies and capability, heutagogy moves educators a step closer toward better addressing the needs of adult learners in complex and changing work environments" (Blaschke, 2012, p. 60).

In a similar debate inherited from the design-studio pedagogy, fashion design is a hands-on practice, linked to the *atelier* environment, where students interact with instructors and materials. Whether this practice depends on the atelier's materiality, or can happen in online environments, the main concern in this research was not the delivery method, or the core content. The primary focus of any educational endeavour should be the establishment of a coherent theoretical structure, able to guide curricular, resource, delivery, assessment choices and to reinforce a quality learning process. Furthermore, for good or for bad, the traditional fashion design practice differentiates from the other areas of design, in that it relies less on collaboration and peer feedback, although it is welcomed, and more in research and innovative capabilities of the fashion designer in manipulate the sources. Technology itself cannot guarantee that students or professionals would learn, engage, explore, collaborate, and create effectively. Hence, the necessity of a body of studies on educational processes for the fashion design sector that could scaffold the adoption of technologies was then a recurrent concern of the research. Simon's Connectivism Theory, for instance, as presented by Brindley et al. (2009) sustained the connectiveness offered by the world wide web as an opportunity for learners to communicate and to negotiate their own personal perspectives with a larger community, promoting preconceptions ruptures, openness, and creative thought. So, the quality of the learning experience in Fashion Design did not presuppose a physical, face-to-face interaction. This is the principal argument against online learning in fashion design: that some aspects of the fashion design process depend on touching of the fabrics, material selection, fitting. However, the designing of fashion also requires aspects related thinking, exploring, communicating, sharing resources and information, creating, innovating. These could take advantage of the potentialities offered in an online environment. Still, instead of accepting the constraints of online learning for fashion design, this research preferred to investigate its possibilities. Studies on online learning or collaborative technologies for fashion design education, structured by coherent education process were rare, representing a serious gap in the body of knowledge.

The literature review identified several studies on technology advancements in distance education, that considered its importance for collaborative learning (Aires, 2016; Berglin et al., 2008; Berk & Wallinger, 2019; Bernard & Rubalcava, 2000; Curtis & Lawson, 2001; Greener, 2017; Hegarty, 2015; Jaakkola, 2015; Johnson et al., 2016; Lee et al., 2019; McPherson & Bacow, 2015; Pečar, 2016; Peters, 2014; Shreeve et al., 2008; Stoeklen et al., 2017). Lee et al. (2019) for instance presented an educational framework and instructional strategy of co-design method and invited undergraduate students in fashion design to test the prototype. The study was relevant to bring alternative methods for design education. However, most of these studies adopted a teacher-centred, pedagogic approach, which presented limitations for the adult education, under a lifelong learning perspective. Few studies analysed web-based, digital, virtual technologies (online, blended, computer supported, mobile, etc.) or alternative learning environments and approaches, specifically for design education, also maintaining the pedagogic perspective (Ahmad et al., 2020; Amorim et al., 2010; Berk & Wallinger, 2019; Bohemia & Harman, 2010; Bohemia, 2004; Casciani et al., 2021; Claros et al., 2015; Delacruz, 2009; Faerm, 2014b, 2019; Fleischmann, 2018a, 2018b; Lourenço, 2007; Souleles, 2011; Wang, 2011). Still, they were further analysed in next section since they could provide practical educational insights. Under the scope of the technological changes, some studies reviewed or proposed changes in the design or fashion design curriculum, to promote greater flexibility and collaborative learning experiences (Brandewie & Kim, 2019, 2020; Coryell et al., 2014; de Fatima Sanches, 2018; de Martinez & Navalon; Esparragoza & Devon, 2005; Félix et al.; Lehner & Wurzenberger, 2013; Menaouer et al., 2013; Rozell et al., 2020; Terkildsen & Pilgaard Harsaae, 2020). The study of Rozell et al. (2020) described the extenuating process of curricular review, more and more required from educational institutions. It presented a deductive, participative, and iterative theoretical framework, less linear and continued, especially adequate for the needs of fashion design programs. The authors reflected that a "continual environment scanning was imperative in determining trends and changes in the fashion industry" (Rozell et al., 2020, p. 19), confirming the need for alternative methodological approaches that could improve education in fashion design. When exploring the fashion design education and the technological changes, the Literature review revealed two paths. Studies that focused on include and experiment with technologies implemented in learning environments, aiming to match the new skills with the market demands and studies in which fashion design or a fashion related subject were the topic chosen to test the technological implementation. (Bertola, 2018; Gu & Liu, 2019; Hodges et al., 2020; Jerrard & Bell, 1998; Jiang & Jin-Hua, 2017; Kazlacheva et al., 2018; Lee et al., 2021; Lu, 2018; Nobile et al., 2021; Petrak et al., 2018; Pires, 2019; Qu, 2018; Spahiu et al., 2021; Surani et al., 2021; White, 2019;

Yezhova et al., 2018; Yick et al., 2018). Finally, when searching for studies that presented or explored alternative theoretical or methodological approaches for fashion design education, very few were included (Ma, 2008, 2009; Pires, 2019; Reddy, 2014a, 2014b, 2016, 2017; Reddy & Rajaram, 2015). The analytical exercise of these studies helped to identify key concepts, principles, and theories that could contribute to build a coherent theoretical framework. Design and Semiotics approaches combined with Heutagogy theory formed a coherent theoretical framework to support an educational model for fashion design, considering the online environment and that encompassed collaboration, anticipative thinking, and autonomy.

2.4 Heutagogical principles for fashion design education

Heutagogy is the study of self-determined learning. The definition of this theoretical approach on learning places the learner (self-determined) in the centre of the learning process. The principles of Heutagogy, as coined by Stewart Hase and Chris Kenyon (Hase, 2002, 2013; Hase & Kenyon, 2000; Hase & Kenyon, 2007; Hase et al., 2006) challenged the main structure of learning and teaching (pre-defined and fixed curriculum, outcomes, assessment) in search of an approach more aligned with the technological, flexible and uncertain landscape. Table 1 resumes the principles of Heutagogy "Heutagogy recognizes that people learn when they are ready and that this is most likely to occur quite randomly, chaotically and in the face of ambiguity and need" (Hase, 2009, p. 45).

Table 1 The Principles of Heutagogy

- involve the learner in designing their own learning content and process as a partner.
- make the curriculum flexible so that new questions and understanding can be explored as new neuronal pathways are developed.
- recognize that learning is non-linear.
- individualize learning as much as possible.
- provide flexible or negotiated assessment.
- enable the learner to contextualize concepts, knowledge, and new understanding.
- use experiential learning techniques.
- facilitate collaborative learning.
- facilitate reflection, and double loop and triple loop learning (metacognition).
- provide lots of resources and let the learner explore.
- develop research skills including how to be discerning about ideas and content.
- differentiate between knowledge and skill acquisition (competencies) and deep learning.
- recognize the importance of informal learning and that we only need to enable it rather than control it.
- have confidence in the learner.
- recognize that teaching and teacher control can become a block to learning.

Note: The principles of Heutagogy based on the Heutagogy Community of Practice blog.

To understand how self-determined learning (Blaschke et al., 2014) processes occur, especially ones that happen spontaneously (in working situations, for instance), Heutagogy favours practices and approaches such as Constructivism, Action learning, Distance learning, Collaborative learning, including Connectivism (Duke et al., 2013), and get closer to theories such as Complexity systems theories (Hase, 2002; Hase & Kenyon, 2007; Phelps & Hase, 2002; Waldrop, 1993). The heutagogical approach recognises that learning surpasses the formal, fixed, physical environments and structured programs, and acknowledges technology influence in creating, sharing, and managing information (Agonács & Matos, 2019; Blaschke, 2012, 2018; Blaschke & Hase, 2016, 2019; Chacko, 2018; Hase, 2009; Hase & Kenyon, 2007; Hase et al., 2006; Moore, 2020; Narayan & Herrington, 2014; Narayan et al., 2018, 2019; Reaves, 2019; Sumarsono, 2020). This is because heutagogical key concept, self-determined learning originates from the distance learning[26], in which the learning is self-paced, and learners need to manage their learning pathway. But the heutagogical, self-determined learner, under a lifelong learning perspective (Semeniuk, 2019), is not a responsive one, but proactive. He/she knows how to learn and plan, updating knowledge and skills and can apply them in unexpected situations. The self-determined learning roots in the notion of double-loop learning, that (Blaschke, 2012) depicted as a transformative process, in which learners, questions personal values and assumptions, because of the learning experience. Like design, as learning (Lawson & Dorst, 2009), the heutagogical process does not focus solely on identifying the problem, but it presupposes reflecting upon it, and changing one's own mindset while trying to find a solution.

So, heutagogical learning is not about learning techniques and procedures, or accumulate skills and knowledge (competences), which are not enough in the current ever-changing, technological landscape. explained that while competence relates to the knowledge and skills learnt previously (associated to the knowledge worker and the knowledge-based economy), it is not sufficient for future uncertain scenarios (Hase et al., 2006; Margarit, 2021; Palaiologos, 2011; Reddy, 2016). The heutagogical concept of capability[27] is "learning how to learn and being able to harness learning, when it occurs, in meaningful ways. It involves the ability to recognise the learning moment" (Hase, 2009, p. 45). So, while competence (skills and knowledge) is relevant to develop self-determined learning, the heutagogical

26 "Self-determined learning, characteristic of distance education formats such as contract learning and prior learning assessment, is also an attribute of distance education." Blaschke (2012, p. 57).

27 borrowing from the work of Stephenson and colleagues on capability (eg. Stephenson, 1996; Stephenson & Weill, 1992; Coomey & Stephenson, 2003).

principle of capability, is more relevant in uncertain scenarios, as expressed by Hase et al. (2006) "there is a significant body of evidence suggesting that competency is a necessary but not sufficient condition on the journey to developing human capacity at work and there is a need for a more holistic approach." (Hase et al., 2006, Learning for Complex Adaptive Systems section). Narayan and Herrington (2014) explained the concept of capability as a process that develops individually but negotiated collaboratively, in (learning) environments that allow "learner-generated ecology of resources or learner-generated context" (Narayan & Herrington, 2014, p. 153).

In the post-pandemic scenario, of constant changes and uncertainty, of technological immersiveness, traditional education models, supported by traditional, fixed, transmission-mode, teacher-centred pedagogies cannot cope with the rapid demands of the professional or academic settings. This research questioned the emphasis on the development of competences in fashion design higher education, focusing on textiles, pattern making, colour harmony, mood boards or sketches, necessary to create an artifact - the clothes, but that do not promote capability learning in fashion design and promote the anticipatory thinking, the prospective behaviour and innovative strategies that could affect the sector.

> "we need to be thinking about wholes and relationships between parts, not the parts themselves. Learning is non-linear and unpredictable. It involves cognitive processes in the individual that are self-determined and highly context driven. Learning is an emergent process with its own time and place and is always incomplete." (Hase et al., 2006, Developing Capability: Beyond Competence section)

This is the concept of fashion design adopted by this research, and which is opposite from the fast, copy-like, soulless, disposable "fashions". In this research, fashion design is a holistic process based on design principles of user-centredness, that stimulates designers to think about the human factors, the product full cycle, the resources, the production processes involved.

2.4.1 Fashion design under the complexity theory

It is almost common sense to refer to fashion as a system and a complex one, in which different parts (creation, production, distribution, consumption and discard) interrelate and how intricate they are with aspects such as globalization, overconsumption, human labour exploitation, sustainability, consumer behaviour, marketing strategies, branding, digital retail, just to name a few. Fashion is "a concept that embraces not only the business of fashion but also the art and craft of fashion, and not only production but also consumption. (...) a complex social phenomenon, involving sometimes conflicting motives (...).

The fashion industry thrives by being diverse and flexible enough to gratify any consumer's desire to embrace or even to reject fashionability"(Encyclopaedia Britannica, 2021).

Each part of the complex system of fashion relates to each other, feeding, interpreting, adapting, and constructing in context and new contexts. This means that, since fashion as a system, is immersed and related to other complex systems, there is no way of knowing for certain the initial conditions that started or spread a fashion trend or a fad, for example, neither why nor when exactly some fade while others don't. As stated by Hase et al. (2006) "This is characterised by systems in the environment constantly changing their relationships, form and structure, and even disappearing" (Hase et al., 2006, Learning for Complex Adaptive Systems section).

With fashion design, this means to "constantly scanning the environment in order to adapt quickly and even anticipate change" (Hase et al., 2006, Learning for Complex Adaptive Systems section). So, it made sense to resort to complexity and systemic approaches, to propose alternative models of fashion design education. Under a complex systemic perspective, it is justifiable that a theoretical framework contemplates fashion's complexity and systemic effects in the learning process and doing so, moves the focus from trying to understand and control its parts, to investigate their sum, their interactions, their inevitable changeability, and adaptability, designing programs, curriculum, delivery, and assessment methods that promote unexpected, and innovative, outcome. The fixed learning outcomes produces fixed assessment processes, misaligned with the instability of the work environment and meaningless for professional needs. Knowledge produced by separated disciplines cannot address the different layers of problems or propose innovation to the fashion or other sectors of the society and the economy. Bertola (2018), for instance presented the "Triple Helix"[28] concept (Etzkowitz & Leydesdorff, 1995) to propose recommendations for the fashion education system.

> "The idea of a flexible curriculum has been previously noted by complexity theorists working in education, such as Doll (1989), for example, who thought that one problem with curricula was the tendency to be fixed and linear - largely modernist in their basic assumptions." (Hase, 2009, p. 47)

If fashion is characterised by the planned obsolescence process that thrives in changing scenarios, and prosper in uncertainty, opposing itself in every new collection, how can fashion design education

28 The author adapted the original model from Henry Etzkowitz and Loet Leydesdorff (1995), and the role of Government, Universities, and industry in producing knowledge for the social and economic growth.

continue structured in traditional and linear system? If each new fashion project, fashion collection opens the opportunity for new learning (double-loop learning process) is fashion design education promoting reflective and deep-thinking processes to foster innovative solutions? Is fashion design education preparing self-determined learners capable of facing or to change the future of their personal/professional lives? Instead of responding to the next changes in the fashion design landscape, focusing on "competence[29] (...) a modernist view of a world that it can be broken down into simple, measurable parts that can be actioned independently" (Hase et al., 2006, Developing Capability: Beyond Competence section), fashion design education needs to adopt a prospective approach, to educate learners to understand the rapid paced and complex fashion system, its many interrelated sectors and how fashion designers can promote change and innovation in this dynamic, flexible environment.

2.4.2 The heutagogic approach for a collaborative, online learning in fashion design

This section further analyses studies that investigated opportunities for collaborative learning in online environments, uncovering heutagogical principles such as collaboration, communication, negotiation, personalisation. This was relevant to understand how the principles of Heutagogy, related to design and fashion design education, support a collaborative online learning for fashion design (Blaschke, 2018; Blaschke & Hase, 2021; Blaschke et al., 2014; Blaschke & Marin, 2020; Halupa, 2015; Jaakkola, 2015; Moore, 2020; Richardson et al., 2018; Stoten, 2021). There was a common sense, among the reviewed works, that there was a discrepancy between fashion design programs and fashion design competences needed. There have been different and valid initiatives to bridge this gap, by reinforcing and supporting internship programs, by bringing company leaders and professional to collaborate in the academic programs, even by proposing technological solutions to match students and companies.

> "Heutagogy has been identified as a potential theory for applying to emerging technologies in distance education (Anderson, 2010; Wheeler, 2011), although additional research and discussion is necessary in order to determine the credibility of heutagogy as a theory of distance education." (Blaschke, 2012, p. 61).

29 Capable people traits, according to Blaschke (2012, p. 59): self-efficacy, in knowing how to learn; communication and teamwork skills, working well with others; creativity and adaptability, in applying competencies to new and unfamiliar situations; positive values.

Different studies developed by Ma (2008, 2009) demonstrated that, supported by a sociocultural framework, online interactions, use of a computer-supported resources, peer feedback, reflective reports and sketches sharing promoted creative processes. The author studied the creative processes of a fashion design activity in a Computer-Supported Collaborative Learning (CSCL). The author used a blended method of delivery supported by the Activity Theory framework (Yrjö Engeström, 1987 as cited in Ma, 2008) developing an analytical instrument to understand how collaborative interactions influenced creative solutions. Ma (2008, 2009) summarized three continuing phases of the study, starting with exploration and clarification, evolving to negotiation and argumentation, and completing with evolution or redesign. One important feature of the process was that it explicated the interactions among the learners, while communicating, exchanging ideas and resources, and creating a sense of community around the activity, objects, subjects, specially enriched by the online environment. In a similar perspective, Corallo et al. (2010) presented a methodology based on constructivism and behavioural approach (behaviourist), as well as learning by doing and learning while doing pedagogies to monitor a master's program developed by the University of Salento (Italy) held in a virtual environment. The aim of the study was to evaluate the evolution of knowledge, mental processes, interaction dynamics in social networks and the general satisfaction of students, tutors, mentors, and external partners–learning community (Corallo et al., 2010, pp. 135-136). The authors argued[30] that knowledge is a social product, built from the need to solve problems. Thus, knowledge and learning belong to the cognitive dimension, but it is through its social dimension, the individual interactions, peer cooperation, partner participation, group support, that a learning community capable of delivering positive results and producing innovation (Lee et al., 2019; Vijayalakshmi & Kanchana, 2020). Kovach and Montgomery (2010) resorted to the critical education approach for adults and learning technology tools to promote online courses, programs, and content that were in line with the plurality of individuals and with the needs of the job market. They proposed that (indigenous) adult education needed to focus on how adults learn and develop knowledge (adult education theory). The authors argued that virtual learning communities can support a diversity of individuals, develop contextualised and personalised teaching methods, centred on the perspective of the individual, combining theory and practice, and increasing interest in continuing learning.

30 According to the theories of Johnson and Johnson (1996) and Vygotsky (1978)

Brindley et al. (2009, p. 4) also supported the social interactions presenting the four-stage framework for e-learning, as a process that started with communication, moved to collaboration, to cooperation and ended in a community, formed from the sharing of contextualized and meaningful ideas and from the respect of personal and professional experiences. These studies proved the relevance of the communicative element in online environments, and emphasised the value of information and communication technologies, to start, assess and maintain collaborative behaviours and ultimately to enable co-construction, co-creation of new knowledge and potentially innovative solutions. The importance of the communicative element was also in Ma's (2008) study, who analysed the exchange of messages. It was possible to infer that in the background of a collaborative and technologically enhanced environment, was the need and willingness to communicate, which presupposed ability and opportunity to connect. Connectivity was then a key-concept in the study, since it entailed the understanding of technology's role and impact in contemporary social dynamics, the way people interact, experiment, learn and work. Brindley et al. (2009) resorted to Siemens (2004) Connectivism Theory to help understand learning in a technologically immersed landscape, where different individuals and resources connect to create and access experiences, perspectives, and real-world activities.

> "From his viewpoint, learning in the digital age is no longer dependent on individual knowledge acquisition, storage, and retrieval; rather, it relies on the connected learning that occurs through interaction with various sources of knowledge (including the Internet and learning management systems) and participation in communities of common interest, social networks, and group tasks." (Brindley et al., 2009, p. 3).

Hase (2009) also recognised the importance of connectivity to enable learning, to exercise and experiment, to collaborate and ultimately to create environments that "transcend the boundaries of the classroom or institution" Hase (2009, p. 46).

The Activity Theory of (Engeström, 2009) also presented in the study by Ma (2008), presupposes a process of co-creation and redesign, which entangles an important concept related to collaborative learning - open negotiation and argumentation. Hase (2009) considered that "(...) processes such as action learning provide a way to manage the dynamism of negotiation with the steps of planning, implementing, monitoring, and reflecting, which are repeated in a cyclical fashion" (Hase, 2009, p. 49) Negotiation, as defined by Hase (2009) is understood as a process with which designers are used to do. The design process is also a collaborative one (Ma, 2008, 2009), thus requiring negotiation. Like the action learning, the design process starts with (Hase, 2009, p. 66; Ma, 2008, p. 47) problem recognition, research, design and evaluation. Negotiation implies acknowledgment of the context and

interaction among people, to stimulate an open environment for creative dialogues and innovative answers. In this sense, context is not associated with a physical space or location (Narayan & Herrington, 2014, p. 153), rather it is present, for instance in an online learning environment, and it can influence and be influenced by the individual and collective experiences. Thus, negotiation occurs in a social context, a community of knowledge that negotiates different situations and scenarios, which then can encourage creative and innovative learning processes (Das & Mathew, 2019; Hodges et al., 2020; Ma, 2008, 2009; Postlethwaite, 2020).

Ma (2008) presented yet another principle from Engestrom's Activity Theory, that could contribute to a fashion education in online settings: the exploration of ideas, new processes, new inspirations. As individuals interacts with different sources, ideas, and perspectives, they contribute to build the knowledge of an entire community. Hence exploration is a collaborative activity, and the openness of the online environments offer great opportunities promote learner's development and autonomy (Brindley et al., 2009). The Internet access, the evolution of personal computers, social networks, and internet-based services have changed the way individuals relate socially, the way they learn and work (i.e., working from home during the Covid-19 confinement) and will change the structure of education, that will need to offer alternative learning pathways, more consistent with current and future socioeconomic landscape (Varonis, 2013). Varonis (2013) also suggested that a collaborative approach to distance learning, combined with a technological support system, could provide more accessible content and programs, and encourage innovation. The author indicated that one of the positive aspects of online courses was the ability to offer a collaborative, shared, accessible and flexible learning experience. However, she also acknowledged the resistance in accepting online courses (full or hybrid), especially due to distrust in the quality of results, the need to update the teachers, the lack of access (technological and financial) and the fact that not all students have the discipline necessary to follow an online program. Obstacles that had to be quickly overcome during the imposed confinement because of the Covid-19 pandemic.

Narayan and Herrington (2014) studied how collaborative technologies, supported by heutagogical approaches, could increase "learner autonomy over where, when and how learning occurs" (Narayan & Herrington, 2014, p. 151). The authors considered collaborative technologies allowed each person to contribute and learn, at an individual level, reflecting and bringing their experience and at a group level, communicating ideas and points of view, debating, and negotiating. Daughtery and Berge (2017), for instance, analysed how m-Learning technologies (which they distant from the idea of a learning "on the move") permitted an interactive yet personalized learning experience. Supported by mobile devices,

in different contexts, mobile learning prompted learners to be content creators, besides content consumers. Similarly, (Blaschke, 2012) advocated that social media support self-determined Learning since they stimulated collaboration, information sharing, and reflective thought. Daughtery and Berge (2017) presented a comprehensive review of mobile learning pedagogies and analysed theoretical perspectives whereby the process of education could improve using mobile technologies.

Blaschke (2021) analysed the heutagogical approach during the Covid-19 restrictions, which forced changes in the traditional classrooms. The author studied a master program in Israel that incorporated heutagogy supported by digital tools and traditional teaching. In a previous study Brindley et al. (2009) applied a set of instructional strategies[31] in a Master of Distance Education (MDE) program, that demonstrated how collaborative technologies, grounded by a coherent theoretical perspective, supported new methods of assessment, and ensured the learning quality. A similar study was conducted by Nkuyubwatsi (2016) using heutagogical resources to support open, online and distance learning for disadvantaged/underprivileged students, contributing to the engagement, participation, and enrichment of the learning community. Reddy (2016, 2017) studies revealed Heutagogy as a suitable approach not only because it studied the usage of technological tools among fashion design learners, but because it brought a set of pedagogical concepts, specifically suitable for fashion design education and practice as well. Still, few studies (Ma, 2008, 2009; Reddy, 2016) considered the Heutagogy theory for fashion design education and even fewer analysed the collaborative and online environments, or implemented learning experiences based on collaboration, on knowledge construction and contextualised ways of assessment. These authors presented a set of methodological approaches, from a constructivist perspective, that sustained the online communities of practice, and in the findings, they revealed an enhancement of autonomous behaviours and innovation in teaching and learning activities.

Other studies also focused on theoretical support to understand the technological contribution in different educational scenarios, distancing from studying the technologies in learning environments, as the device, the delivery method, or the platform (Hodges et al., 2020; Lu, 2018; Nobile et al., 2021; Postlethwaite, 2020; Terkildsen & Pilgaard Harsaae, 2020; Yick et al., 2018) They observed that without

31 1) transparency of expectations - the purpose; learning objectives;2) clear instructions - they should not waste time trying to understand the time, but in the 4 steps of group work; 3) appropriateness of task - some tasks should be individual while other not; 4) meaning-making / relevance - work context, personal, real life situation; 5) motivation to participate - individual success represents group success; 6) readiness of learners for group work - they have to master the main, basic concepts, knowledge, skills; 7) timing of group formation - when they should gather; 8) respect learners autonomy; 9) monitoring and feedback; 10) time for task - to accomplish the task.

the support of an educational framework, the technologies were a set of tools to which would need new skills and that alone will not contribute to meaningful and contextualized learning. Therefore, it was very important to explore Heutagogy, the self-determined learning approach, as a theoretical support to collaborative online learning proposals, especially for fashion design education.

The Covid-19 pandemic proved that the educational system delayed the discussion about online learning, the technologies and environments, their limitations and potentialities, their applications in different fields of learning. And when considering the education in fashion design, academic research failed to investigate theoretical approaches that could generate a high quality of learning more coherently with the fashion design profession. Like any former educational enterprise, educational resource, or environment, it was necessary to study coherent theories that supported digital, virtual, 3D, online technologies to ensure the quality of learning, encourage collaboration, incite innovation and creative outcomes. Supported by the appropriate theoretical foundation these technologies can promote learner-centred learning, improve personalisation, and help learners reflect upon their learning processes, acknowledge their experience, and develop a deep thinking necessary when facing unstable professional landscapes, new situations, and new challenges. They can also enhance interaction and communication, creating collaboration and. The review of the literature demonstrated that, supported by a solid theoretical framework, technology-based collaborative, online environments can help fashion design learners to develop reflective thinking, and prospective capabilities to manage their learning pathways and became self-determined learners. The studies analysed demonstrated that technology-based, collaborative, online learning environments, when supported by a coherent theoretical approach (Constructivism, Connectivism, Heutagogy), represent a valid model to produce and deliver knowledge about fashion design. Technology-immersed environments can enhance the exploration of multiple sources of information. To identify, select and challenge divergent opinions, learners need to develop reflective thinking, that will help them analyse, discuss, and negotiate different ideas and achieve creative and contextualised outcomes. More involved with their learning paths, learners develop prospective attitude, imagining potential solutions, instead of reacting to problems. Free from the rigidity of traditional academic stages, calendar and physical limitations, collaborative, online learning could approach urgent themes of in the fashion sector and then enable to assess this knowledge and diffuse it among professionals and companies in a flexible, adaptable, and affordable manner.

The social restrictions provoked by the Covid-19 pandemic exposed even more the twenty-century structure and reactive behaviour of the higher education sector towards the socioeconomic changes. This was also true for fashion design higher education (Faerm, 2014a, 2014b, 2019). When focusing

on the digitalisation or virtualisation of fashion design, once again, higher education adopted a responsive attitude, while fashion professionals and companies found new ways of creating, sell, and communicate fashion products and fashion collections, resorting to virtual fashion shows, collaborative and co-creation networks, and the dematerialization of the fashion processes through 3D technologies (Spahiu et al., 2021).

If the Covid-19 pandemic accelerated the instability in the market, the post-pandemic landscape will continue to provoke changes in the fashion sector, and put more pressure on urgent matters, such as sustainability, in relation to fashion development and production). Fashion companies had to innovate quickly in materials (resorting to old textiles for instance, or reusing previous collections), processes, design, production and to open new channels of communication and distribution. The pandemic brought a change in consumption behaviour and consumer's lifestyle, more sensitive to ethical and environmental aspects, but also demanding more meaningful and personalised experiences. The post-pandemic period will, once again, demand a new set of competences from fashion professionals and higher education in fashion has, once again, the opportunity to adopt a prospective holistic (Blaschke & Hase, 2016) attitude, exploring new, more flexible, and personalised models of learning that help students to uncover the future set of competences they will require in their professional lives, in different settings. In the digitally, virtually connected society, fashion sector cannot remain trapped by the same linear-production system and fashion higher education cannot maintain the same linear-education system, trying to keep the control over the learning experience.

It became clear that fashion design education still demands further investigation on methodological approaches and educational possibilities that may accommodate the specificities of its complex system under a technologically immersive environment. Heutagogy is a valid approach to sustain collaborative online learning environments in fashion design education. The next section investigates how the key heutagogical tenets, student-centred learning, double-loop learning, non-linear learning, and self-determined learning relate to Design and Semiotics approaches and how they could support a theoretical framework for fashion design education.

2.4.3 The semiotic approach for a collaborative, online learning in fashion design

> "Semiology therefore aims to take in any system of signs, whatever their substance and limits; images, gestures, musical sounds, objects, and the complex associations of all these, which form the content of ritual, convention or public entertainment: these constitute, if not languages, at least systems of signification." (Barthes, 1967, p. 9)

It is a fact that Covid-19 amplified people's interactions in the digital dimension. If we were leaving in a digital world, the reality post-pandemic will put greater value in the immaterial or in digital products and services. Under this globalised, abundant, and automated reality, the 'knowledge worker' is already being replaced, or at least forced to transform into the 'concept worker' (Pink, 2006, p. 2). This professional has inventive, empathic, "seeing-the-big-picture" capabilities, and present "a very different kind of mind - creators and empathizers, pattern recognizers, and meaning makers." (Pink, 2006, p. 82). So, understanding how the Semiotic approach contributes to understand the (im)materiality of the world seemed obvious. It seemed relevant to discuss the (im)materiality of the design outcomes, at what point the materiality appears, or should appear, in the process (i.e., in the studio, in the materials, in the products, etc) and how it relates to the solutions design provides. "Semiotics must be viewed as a 'mechanism' working inside of design rather than as a microscope to analyse the results of design." (Deni & Zingale, 2017, p. s1294). UX and UI design, for instance, creates accessibility, storage, flow, immaterial goods. In this same perspective, product design creates a way of sitting comfortably, not the chair. Hence, the user gets interested in the seduction, image, appearance, status, different meanings, ideas, concepts - that's where semiotics comes in to form a design education supported in online environments that are not necessarily based on the materiality of the atelier.

Design education should envision in its programs the study of hyper-connected and multicultural scenarios, offering pathways that will prepare designers to develop meaningful solutions, adapted to ever changing challenges (Esparragoza & Devon, 2005). Fashion design professionals need to balance aesthetic with practical functions, associated with the logic of markets, production, and consumption. To do that, fashion designers need to develop an interpretive sense, important to comprehend and transpose social codes into innovative design solutions.

So, one of the major roles of a fashion designer is to read and interpret a set of artistic, social, cultural elements and give them meaning, according to the wearer's expectations - fashion designers are, then, social decoders. Therefore, it would be only natural to contemplate the entire fashion design process as a meaning-making one, running semiotically to 'make sense', aesthetically. The semiotic perspective is then essential to fashion designers not only to decipher, interpret and create meaning out of the social and cultural landscapes, but also to deal with the complexities of the professional contexts. Semiotics is a consistent base to comprehend the design process and should therefore guide educational programs of fashion design. Fashion design higher education would benefit greatly from a semiotic perspective to foster a set of multi-layered, diversified capabilities fashion designers require meeting and envision the rapid changes in the fashion production, distribution, and consumption.

Converting materials, shapes, colours, volumes into meaningful products (clothes and collections), fashion designers understand not only the techniques, processes, and methods, but the interpretative aspect fashion plays as a social and cultural code. The process of designing fashion it primarily to make sense of the complex, multicultural and ever-changing global market. Fashion designers need to establish meaningful relations not only between clothes constituent elements and the final look, but among the dynamics of imitation, distinction, adaptation (or reinterpretation), and discard adopted by certain social groups, under different sociologic, economic, cultural, historic, symbolic, communication contexts and periods. They are cultural creatives and agents of change, able "to create artistic and emotional beauty, to detect patterns and opportunities, to craft a satisfying narrative, and to combine seemingly unrelated ideas into a novel invention." (Pink, 2006, p. 679). Fashion designers negotiate the relation between the local–global since sociocultural expressions have decentralised origins and influences.

So, to identify, select and interpret the abundance of information scattered in a culturally hybrid global scenario, a semiotic perspective is an essential approach to fashion design higher education. As a reflective thinking process, fashion design requires mental processes associated with ideation, imagination, creation, planning, drawing, prototyping. So, complementarily with Heutagogy, through reflective thinking and deep learning, Semiotics help fashion design learners develop analytical capabilities to work with multiple realities without replicating it. Semiotics' perspective on fashion design higher education is especially relevant in online environments because it contributes to understanding the complexity involved in (fashion) design projects and to decoding the digital context of the sector.

Fashion design is a planned process of interpreting sociocultural phenomena and market information, a signifying process that relies on interpreting codes and signs, and then create, through a specific set of media (clothes), an experience to stimulate aesthetically, which sometimes becomes part of the purpose or even its primary goal of fashion creation.

From a semiotic perspective, the set of visual elements (signs) that compose fashion collections (fabrics, textures, trimming, patterns, colours, cuttings, shapes, dimensions), carries denoted meanings, but the connoted meaning emerges from the succession and composition of the whole ensemble (significances), where all the elements are 'communicating' with each other, with other ensembles within the same collection, and with the consumer - this aesthetic 'harmony' entails, in fact, an intrinsic method of design as a semiotic process. In the development of fashion collections, designers rearrange the visual elements (re-signified) into romance, fantasy, or retro interpretations, semiosis - a sign

process[32] (Buchler, 1955), creating different meanings. So, the designer's interpretation, the concept, the history, and the brand identity communicate with consumers through fashion shows, fashion editorials in a magazine spread, in the brand's website or in a fashion shop window[33], and sometimes even without the presence of clothes itself. However, the semiotic flow continues with the social and individual intentions of the fashion consumer, that will re-interpret and create new uses for the fashion product. So, fashion design is not merely a creative process that imposes the designer's view, but an encoding (proposes codes) and decoding (deconstructs codes) process, because fashion is entangled in social and cultural contexts. The designer activity as interpretative and communicational as it is projectual. They need capabilities to observe, comprehend, anticipate, employ deep thinking, decipher the codes of the complex system of fashion, to produce, materialise and communicate visual outcomes. As social decoders, fashion designers need to be aware of the meaning-making process present in human interactions with the clothes. Capable of navigating in the symbolic world of fashion, fashion designers decipher the fashion system codes, use semiotic resources (Van Leeuwen, 2005) to produce artefacts and to interpret them. Decoding and encoding, comprehending, observing and get inspired by different social and cultural contexts, the fashion designer establishes atypical connections and hypothesis, "generating, analyzing and synthesizing ideas for the solution of problems for the benefit of the human community" (Esparragoza & Devon, 2005, p. 3). Finally, fashion designer as a decoder acknowledges imagination as the main capacity to foster innovation, to propose 'a re-creative reading of reality' to 'stimulate and orient our action' (Barrena, 2013, p. 2), and to transform a known reality into 'another meaning' (Folkmann, 2010b).

Next section will study the relations between semiotics and fashion design within the educational context, supported by the perspectives of Italian semioticians, Salvatore Zingale[34], Giampaolo Proni[35] and Michela Deni[36]. The aim was to understand how a semiotic approach can promote learning that considers the reflectiveness instilled in conceptualization, the conscious meaning-making, the

32Employing a Peircean perspective on fashion design process (Buchler, 2012).

33McLuhan discusses how the communicational experience can be influenced by the medium involved. In fact, content disguises the medium, the power of the medium, we forgot about its presence, we are blinded by the content, and we don't realize how the medium moulds our presence in the world. In the case of fashion design, for instance, our posture or our self-confidence changes when using a formal or informal outfit, a branded designer bag or a copy, because each one brings a specific association, which will influence our actions, our relations with others (McLuhan, 1994, pp. 7-9).

34 Politecnico di Milano, Italy.

35 Università di Bologna, Italy.

36 Université de Nimes, France.

understanding, and interpretation of socio-cultural phenomena, which will affect the project's development. It was also to resort to the semiotic approach to support the activities involved in the education of fashion designers, from the moment they identify, select, and concept the first ideas, a process of abstraction, to the implementation in the project, the exteriorization of their imaginative proposals.

2.4.3.1 The semiotic states of fashion design

Whatever the pathway adopted by a higher education program in fashion design, it will essentially require educating to understand and interpret different cultural codes. So, cultivating a semiotic approach for fashion design education means to organise the creative processes and the learning experience around the imaginative enquiring and the understanding of the ever-changing code system in social and cultural contexts. If the semiotic meaning (Yakin & Totu, 2014) arises from a constant process of re-interpretation ('unlimited semiosis' accordingly to Umberto Eco), then fashion design education could focus not only in creating clothing, but mostly create symbolic or iconic values (signs). Deni and Zingale (2017) stated that there were few studies on Semiotics of design projects and that new and deeper studies on methodology of the project would help diminish the discrepancies between academy and market. The same situation occurs in the education of fashion design. Deni and Zingale (2017) concept of *Semiotic by Design* and the anticipative potential of semiotics by Proni (2006), as well as the role of imagination (Barrena, 2013; Folkmann, 2010a) in reading and creating from the observation of reality led to a new questioning about the ways fashion design could 'proceed semiotically' to understand and anticipate social and cultural codes that influence consumers' lifestyles, behaviours and perceptions about clothing (Calefato, 2002, 2020, 2021). The constructivist approach helped to build a semiotic framework (Figure 4), to envision how the fashion design process happens when structured under a semiotic approach. This section presents the four relations proposed between Semiotics and fashion design, defined as 'states', or the condition that fashion design attains under the semiotic approach, or how this approach influences the fashion design process. The aim was to understand if and how these relations could contribute to the Heutagogy and Design perspectives in supporting fashion design higher education in online settings.

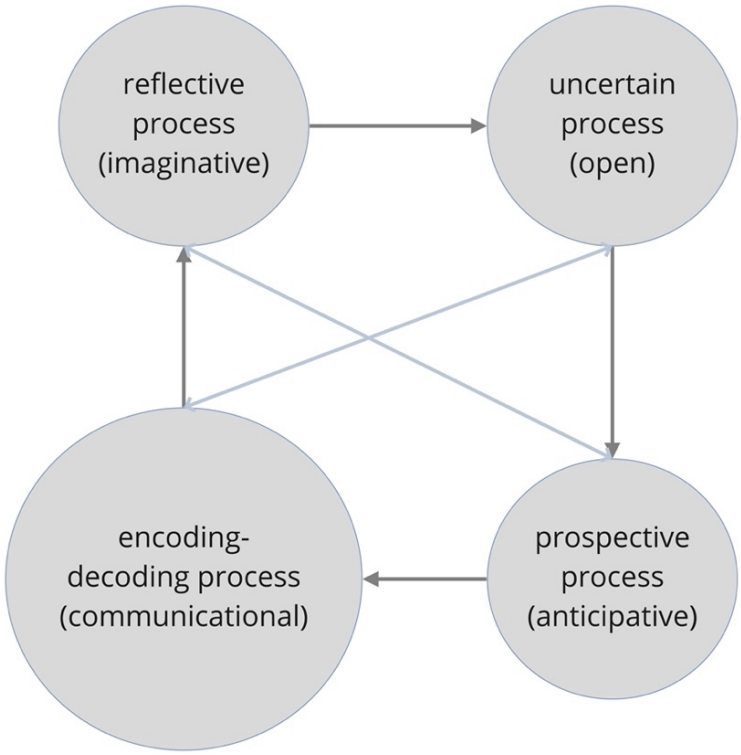


Figure 4 - The semiotic states of Fashion Design

The four states of fashion design entailed fundamental aspects of the fashion design practice (imaginative, communicative, anticipative, and open project), from the ideation phase of a project to the execution and communication of fashion products. Built in a loop, the states constantly feed themselves and are fed by the other states, so does the fashion design process (cycles, trends, and projects). The semiotic state of fashion design entails methodological and analytic dimensions relevant to fashion design higher education.

The semiotic state of fashion design, as a reflective process (imaginative)

"the phases of analysis and project, central nuclei of the project action, are the ones that can draw the highest profit from semiotics."[37] (Proni, 2006, pp. 3-6)

To comprehend (decode) the social system, its patterns, and changes (codes) fashion designers need deep thinking to observe critically the reality, reflect upon it. The reflective process is important in the pre-projectual phase of the design process, before generating an initial mental idea (sign). While

37 "le fasi di analisi e progettazione, nuclei centrali dell'azione progettuale, che possono trarre dalla semiotica il maggiore profitto" (Proni, 2006, pp.3-6)

researching to develop the 'next' fashion collection, for instance, fashion designers start with materials, or they get inspired by novelties. Trend forecasts inform about the psychological, sociocultural, economic, and technological mood of the period. The products function (e.g., winter or summer clothing) may provide designers with the expected requirements to be fulfilled. Proni (2006, p. 6)[38] explained that during the exploration and documentation phases of the project, when the 'unknown' needs to be mapped, semiotics guides the understanding of a complex system of representations from which designers create associations and propose a solution.

> "We must therefore have in mind that knowing is acting and acting is knowing. There is no separation between activities that investigate and know, like science, and activities that modify and build like architecture and design or engineering. There is no separation between perceiving the world around us and acting to change it. The individual interacts with the environment by adapting and modifying it"[39] (Miraglia, 2009, p. 2)

The designer reinterprets the results of the initial exploration and, while doing so, they are already planning to transform the previous reality, devising methods to act upon it.

It is through imagination that designers create mental scenarios that work similarly as a plan, from which they will later act, in combination with new ideas that guide their actions. Therefore, projects do not represent the finished result, but are open, 'planned' ideas of an expected result that might happen, originated by mental abstractions, by observation and interpretation of previously existing ideas. Proni (2006) considered the project "an architecture of the future because it aims to achieve something in a future time" (Proni, 2006, p. 1).[40]

The capability to observe and decode the ideas already materialised in the real-world (Peirce's knowledge as interpretation), helps designers to consider new ideas in the mind, which will then encourage action. This is imagination promoted by the reflecting process, by the 'desire to know' (Barrena, 2013, pp. 3-5), or to reason as a creative process. The observation and understanding of the reality generate accumulated experience, through fashion designer can identify and understand the

38 "(...) i successivi passi della progettazione, è un processo interpretativo che va a costruire la descrizione progressivamente più dettagliata ('densa') di un assente possibile posto come obiettivo" Proni (2006, p.6)

39 "Dobbiamo quindi fissare bene in mente che conoscere è agire e agire è conoscere. Non c'è separazione tra attività che indagano e conoscono, come la scienza, e attività che modificano e costruiscono come l'architettura e il design o l'ingegneria. Non c'è separazione tra percepire il mondo attorno a noi e agire per modificarlo. L'individuo interagisce con l'ambiente adattandosi e modificandolo".

40 "Il progetto è quindi architettura del futuro perché si pone l'obiettivo di realizzare qualcosa in un tempo a venire.

evolution of the social codes and add new ones. Holt (2017, p. 30) also analysed that the role of imagination in design is active, to map what is existent, to alter it, creating new meanings. Folkmann (2010a) study demonstrated that through imagination, designers consciously visualised and intervened (create) in the physical world. So, the reflective process considers imagination with a projectual capability that triggers action and creation.

The reflective process (imaginative) proposes the learning path as a reflective one and helps fashion design students while exploring with shapes or materials, understanding the socioeconomic factors of a trend, or visualising the latest fashion collection. Instead of absorbing the information, this semiotic state guide them to reflect and question, which will provoke imagining new possibilities and make them move from imagination to action. The semiotic state of fashion design as a reflective process emphasises creativity and imagination. Learning occurs by observing and interpreting the reality, using previous knowledge to inspire the 'new' solution, and as a resource for future projects and innovative designs.

The semiotic state of fashion design, as an uncertain process (open)

> "The big disadvantage (of design methods) is that through this kind of teaching we take away the insecurity of the students. It is a way of quickly and efficiently explaining design but that is deadly. Students have to learn to deal with uncertainty, and we take that away by this kind of teaching. In the end, I would say that dealing with uncertainties is the core of our design profession." (Wim Groeneboom as cited in Lawson & Dorst, 2009, p. 33)

Uncertainty, instability, ephemerality defines this semiotic state of fashion design. Projects are constantly evolving, which characterises its uncertainty and a dynamic loop between the project phases (Proni, 2006, pp. 2-3). The effort to understand the unknown, or the anticipation and prediction involved in grasping at something not-yet-existing and presumably preferable, is a specific characteristic of design where the method of development occurs during the process. Thus, while design processes often function as an exploration of the unknown, in fashion design processes, the uncertainty of the unknown can work as the goal (planned obsolescence). Each collection, each season, each design are only transitory solutions, ephemeral ideas, materialised in fashion objects that the wearer will reinterpret, feeding the reality, that will feed back the imagination, with new ideas. The wearer adopts and changes fashion proposals, differently from the original intent, which might inspire back the designer, and so on. This generates and promotes the excitement of fashion uncertainty. In this semiotic state, fashion cycles

are meta-signified, since they (re)interpret, deny themselves, constantly recreating their own meanings, leaving an opening for the uncertainty, the 'unknown', the yet-to-become.

The semiotic state of fashion design as an open project helps learners not only to recognise and thrive within uncertain conditions, but to understand the cycle of fashion as a signifying one. This state helps learners to envision their projects as open ones, understanding the role of the fashion user in reinterpreting it. This state anticipates learners in the flux of fashion dissemination, adoption, and discard, as a continuous process of (re)interpretation of signs, a process that constantly exchanges, enhance, or devalue the initial meaning.

The semiotic state of fashion design, as a prospective one (anticipative)

"The projectual phase is semiotic because it acknowledges the immediate and faces the future. The results are absent, and there are different possibilities." (Proni, 2006, pp. 3-6) The author resorts to Peirce's concept of semiotic as a prescriptive science, because it studies the abstractions of the thought. If to project is to preview, or to plan the action and the means needed to act, then the semiotic state of fashion design, as a prospective one, guide fashion designers in identifying current trends and market behaviour to anticipate changes that might influence brands, companies, or the consumer expectations. Design is an inquiry-based activity that entails a level of uncertainty and anticipation. This semiotic state can help fashion designers to develop a prospective capability, the "semiotic eye (the way of looking at culture as a continuum intertwined with various signification processes)" (Deni & Zingale, 2017, p. s1300). This state emphasises the abstract, connotative, and divergent phase of the design process and help learners to develop a forecasting aptitude, necessary to analyse how "already coded signs intersect with the deep semantic codes of a culture and take on additional, more active ideological dimensions" (Hall, 1980, p. 168).

The semiotic state of fashion design, as an encoding-decoding process (communication)

Barthes (1990); Calefato (2002); Lipovetsky et al. (2010) analysed fashion communication process that promotes spectacularised lifestyles, besides fashion (as clothes) itself. This state entails an important aspect studied by social semiotics– the way meanings are reconfigured, rearranged, in a semiotic and dynamic relation between the wearer and the clothes (design object) (Holt, 2017, p. s337).

Fashion design communication process occurs in the relations between the mediums (designers and wearers), messages (lifestyles) and codes (clothes). It is also present in the planning phase of the

projects, when designers communicate concepts through mood boards, and ideas through prototypes, technical patterns, or when promoting fashion collections and products.

Fashion designers (social decoders and meaning makers) synthesize the information researched and establish connections, interpreting and reinterpreting the social phenomenon and transforming it into clothes (Steffen, 2009; Torregrosa et al., 2014). This semiotic state of fashion design acknowledges the role of fashion designers in (re)creating sociocultural codes into fashion design objects, but also understands that these objects carry the potential for decodification by the wearer. In fact, fashion design products rely on the reinterpretation of its users. So, the semiotic state of fashion design, as an encoding-decoding process, considers the tangible (clothing) and in the intangible (concepts, beliefs, socio-cultural meanings, etc.) aspects of fashion and that help fashion design students to understand clothes in the signifying process, used and interpreted by the wearer. Besides the communicative value in themselves, clothes are communication tools for the wearer, sharing or concealing values and lifestyles. Therefore, this semiotic state understands fashion design as reciprocal and socially constructed (Hall, 1980).

Together, the four semiotic states of fashion design comprehend the capabilities fashion design learners need to anticipate, innovate, project, and communicate by recognising the structures, contexts, and complexities of the sector.

2.5 The theoretical framework for fashion design higher education

Fashion designers need to convert prospective information into innovative, meaningful, current, and validated content that companies and professionals may quickly access and integrate into their practice, which creates the need for constant innovation and creativity. So, what kind of learning would foster autonomous, prospective, meaningful experiences in fashion design? What principles would be necessary to frame such kind of learning?

Learning in fashion design needs to prompt opportunities of contextualized collaboration among learners, that come from multiple backgrounds, without the limitation of time and space, to foster creative and innovative processes. A flexible and collaborative learning environment, would enhance greater fluidity between the learning and professional environments, allowing the learner/professional to travel in both ways, at distinct moments of their lives, with the recognition of the acquired knowledge (obtained professionally or academically). This research does not advocate to achieve this fluidity only by an online, onsite, blended, or mobile supported environment. Although it seemed important to acknowledge and study deeper the technological possibilities for learning, simply proposing a new

delivery method is not enough. This research considers that a meaningful learning environment requires a solid theoretical foundation that contemplates fashion design specificities, meets different professional needs, prepares for the demands and impermanence of the sector, and creates broader learning experiences, offering opportunities in a lifelong perspective. The theoretical framework, integrated here, focuses on fashion design in higher education contexts under a lifelong learning perspective, especially those offered online and collaborative environments.

This section resorts to the theoretical perspectives reviewed in the literature, namely Design perspectives, Heutagogy theory and the Semiotic approaches to ground a valid collaborative, online model for fashion design education (Figure 5). The theoretical framework aligns with the philosophical and epistemological approaches of the thesis and served as a guide for the methodological and empirical decisions in the research design. The framework was a needed foundation for the development of a collaborative online model for fashion design education that could promote a prospective, personalised, learning experience, contributing to the sector's academic and professional future, and collaborating for further research in the field.

Figure 5 - Word cloud of the principles for the theoretical framework.

If fashion design activity basis on novelty, originality, and innovation then, it makes no sense to focus fashion design learning solely in the development of competences (skill and knowledge), or to invest in linear and fixed programs and curriculums. By incorporating the design and heutagogy perspectives (Hase & Kenyon, 2007), fashion design education needs to encompass the technological advancements and prepare students not for the current workplace but to become lifelong learners, self-determined

learners, that anticipate changes, motivated and "making choices that are most relevant or interesting to them" (Hase & Kenyon, 2007, p. 170). Alternative models of education for fashion design capable of the expected changes of the inconstant, global, complex fashion system. So, the theoretical framework needs to consider a greater 'fluidity' between the academy and the market, between the students and professionals. They are both capable of manage a lifelong learning path, either in academic or in professional settings. The framework opens fluidity in learning pathways through flexibility, non-linearity, connectivism and uncertainty to support those who are studying to anticipate the professional landscape and those who work in fashion to be a self-determined learner. The self-determined learner/professional travels back and forward in the academy-company pathways, developing contextualised capabilities that could be timely and costly effective, with the potential to be applied in both settings. This brings another implication of the theoretical framework. If it acknowledges greater fluidity between the academic and professional settings, then what implications this will have in assessment and validity of learning process and outcomes? They might present different meanings for students and professionals. Students value grading and certificates, that are transferred between programs and institutions, especially considering the European Higher Education Area (EHEA) and professionals recognise the value of meaningful competences that might help them conquer a client, develop a project, evolve in their careers, increase earnings. In both cases, though, from a lifelong learning point of view, assessment and validity should accompany fluidity, in this case between formal and informal learning paths. Informal experiences can even lead to or enrich formal learning. This means that a student may or not need a Higher Education certificate to start in the profession, and might pursue it later in life, after acquiring some practical real-life experience. On the other hand, a professional might return to academy to initiate or complete the formal education, seeking better job opportunities or a career change.

The aim of the theoretical framework is to support a learning model offered in online digital environments. Therefore, the framework needs to contemplate the technological landscape, the digital ubiquity, collaborative technologies that not only will provide more tools and resources, but that might change the way fashion design students relate to information, access new knowledge and skill, to creative processes, and the results of the learning experience. Furthermore, technologies can improve and evaluate the learning quality. The framework needs to embrace autonomy and constructed learning, so it emerges from personal or professional real-life experiences, from heterogenous groups of students, professionals, and experts, from current real-fashion demands.

The theoretical framework will sustain the creation of a collaborative online learning model for fashion design, and its practical implementation will require further examination:

- How can competences and capabilities be assessed and validated in such an environment?
- How will learners present evidence of their learning process, contributions, development, so that it can be valid in academic and professional settings?
- What is validation and credibility for professionals and learners?
- Which will be limitations and opportunities of fashion design learning when implementing the model?
- How the fashion design competences and capabilities will be contemplated in the model?

Heutagogy, semiotics and design principles built the theoretical framework, a conceptual exercise that summarised the findings of the literature review and created complementary and interconnected relations between the theoretical approaches. First synthesising heutagogical principles into 5 categories, then associating these categories with semiotics (states of fashion design) and design principles. The result, depicted in Table 2, was the theoretical framework - the *Fashion Design Learning principles* (FDLP): Reflective Thinking, Research & Interpretation, Collaboration & Communication, Creativity & Imagination, Complexity & Uncertainty. The FDLPs, detailed next, had no hierarchical position among them, each feeding and being fed by the other systemically. They guided the creation of a fashion design learning collaborative online learning model.

Table 2 The theoretical framework and the fashion design learning principles (FDLP).

Heutagogy Principles (Blaschke & Hase, 2016)	Heutagogy principles (categories)	Semiotic states	Design principles	FDLP
differentiate between knowledge and skill acquisition (competencies) and deep learning.	Self - reflection metacognition	reflective process (imaginative)	Design loops (divergent-convergent)	Reflective Thinking
facilitate reflection, and double loop and triple loop learning (metacognition).	Double-loop learning			Creativity & Imagination
have confidence in the learner. involve the learner in designing their own learning content and process as partner. recognize that teaching and teacher control can become a block to learning.	Learner - centred learner - determined	prospective process (anticipative)	Human-centred (user focused)	
develop research skills including how to be discerning about ideas and content. enable the learner to contextualize concepts, knowledge, and new understanding. provide lots of resources and let the learner explore.	Capability-based learning	encoding - decoding process (communication)	Context driven (problem-solving)	Research & Interpretation
facilitate collaborative learning. individualize learning as much as possible. recognize the importance of informal learning and that we only need to enable it rather than control it. use experiential learning techniques.				Collaboration & Communication
recognize that learning is non-linear. make the curriculum flexible so that new questions and understanding can be explored as new neuronal pathways are developed. provide flexible or negotiated assessment.	Non-linear learning	uncertain process (open)	Open project	Complexity & Uncertainty

The Reflective[41] *Thinking principle*

Reflectiveness is an important precept for fashion design learning. Aligned with the design divergent and convergent states, and with the semiotic state of reflective process, critical reflection helps fashion design learners to question their processes of thinking while understanding the problem. This principle helps learners to examine their problem-solving processes, to address their experience and previous knowledge, and deconstruct conditioned ideas or behaviours, understand the reasons they bring certain approaches into those design processes, if there is an inclination to resort to pre-existing solutions when designing. Reflection means learning through examination (Bolton, 2010; Hibbert, 2013) of oneself (metacognition) in relation to others and to different situations, or as Lawson and Dorst (2009) explained to "look critically at what you have done... a process of going through many of these 'learning cycles' (propose-experiment-learn) until you have created a solution to the design problem." (Lawson & Dorst, 2009, p. 34). It guides design stages of problem research and definition, the imagination and ideation of possible solutions and that evolve while doing. 3D design printing and prototyping, for instance, allow learners to reflect creatively on the process and adapt, change ideas. The reflective thinking moves in double loops of learning, going forward and back, generating a constant conversation between the designer and the project. From critical reflection emerges agency, a whole-minded design aptitude (Blaschke & Hase, 2021) important for fashion design learning, since it activates preparedness, or an anticipative, precautionary decision-making attitude. Hence, reflective thinking promotes resilience and self-determination to assess critically different and challenging situations, which might trigger agency and evoke prospective solutions. To take informed risks, imagine original solutions, and trigger unintended changes, designers need to recognise and understand the environment and its relations, the design sensibility to analyse "whole scenarios from as many angles as possible: people, relationships, situation, place, timing, chronology, causality, connections, and so on, to make situations and people more comprehensible" (Bolton, 2010, p. 13). Anticipation is essential in fashion design, and it must be stimulated in fashion design learning experiences through an inquisitive attitude and defying minds "searching for questions never asked before" (Bolton, 2010, p. 3) and proposing innovative solutions.

41 Although some authors did not differentiate between reflection (about a problem) and reflexivity (about oneself), the research kept the Heutagogy use, reflective learning, which promotes questioning about "how to learn".

The Research and Interpretation principle

As a dynamic, not closed process, designing in fashion requires an exploratory mindset, in different phases of the (fashion) design development, since each project is unique and demanding, considering time, cost, or technical constraints. It requires the ability to conduct research, to explore alternative paths, methods, solutions, materials, opportunities (Skjold, 2008). Research is present in different phases of fashion design process - from the initial information, got about a fashion brand history and values, its consumers habits and market trends, socio-economic scenarios, to the communication and marketing strategies, until the whole development of a fashion collection, the conceptualization of creative ideas, material choices and appropriated suppliers, technical possibilities, etc. Research is used to find solutions for current design problems, but as explained by Lawson and Dorst (2009) in the exploratory period of design, "problem and solution are evolving and are very unstable" (Lawson & Dorst, 2009, p. 38). So, in design research is an ongoing mindset that keeps designers attentive and prepared when new opportunities surface, helping them to start new creative processes. For instance, the fast fashion model of production that placed new designs available to consumers in few weeks had reached its full potential globally, even before the pandemic outbreak. This 'fast' and soulless cycle of fashion ruined fashion's key characteristics: originality, creativity, and fun. Ironically, the lock downs during the pandemics forced brands to adapt their supply-chain and the post-pandemic landscape augmented fashion digital presence. Technologies such as artificial intelligence (AI), virtual reality (VR) are promoting a more human approach to fashion design. Even before the pandemic of Covid-19, AI, VR, simulation, gaming technologies were bringing to light products, materials, people's stories, diversity, imperfections, and singularities. Those technologies can prompt fashion designers and learners to uncover a hidden word of textile fibres, of virtual garments, of mixing digital techniques and traditional manufacture processes (Euromonitor International, 2017; GSMA Intelligence, 2018; We Are Social, 2022; WGSN, 2017, 2021). So, the disruptive period of the Covid-19 pandemic created a sense of connectivity, purpose and relevance that will influence fashion designers' understanding about what fashion is and their role in the global system of fashion. "At the highest level, design research can give access to knowledge, both research for a particular project and also research into methods and processes" (Moggridge, 2008, p. 5). The design project presents not only a new opportunity to research, but it constitutes research inventory. It provides a body of experience, grown when facing challenging situations, from which the designer develops a stronger and greater repertoire for further actions. Each learned skill and knowledge are research outputs and became research inputs. Last, it is a constructed

negotiation process between design and environment (Krippendorff, 1992, 2005) constructivism, in which each project needs to be (re)contextualized to gain and produce new meanings as the design process develops. The research and interpretation principle for fashion design learning stimulates constructivist processes, acknowledging learners' previous experiences and resorting to them in a future project. It fosters creativity and encourages deep research, diligent inquiry, and logical propositions, but also emphasises contextualization, meaning-making, storytelling, and decodification, since fashion products need to be recognised by the codes of the sociocultural system.

The Creativity and Imagination principle

There is a clear connection between innovation and 'imaginative manipulation' in fashion design practice when developing fashion sketches and illustrations, transforming, and adapting prototypes or elaborating production specification sheets (Holt, 2017). This is not a mere manipulation of resources, equipment, materials. It requires designers' imagination through a representational or an interpretive capability, to transpose the conceptual dimension to the material one. When observing the reality, designers imagine, prospect, predict, forecast different and non-existent options, attempting to alter or to improve the reality, to imagine a better solution. While observing and (re)interpreting, fashion designers are already (re)creating the existing reality in their minds and imagining new, better solutions. This is not a mere observational state, "to envision things that are not present in the physical world that surround us" (Folkmann, 2010a, p. 1). It holds a contextualisation process, in which designers relate exterior inputs with their own experiences, previous knowledge and accumulated resources, as well as personal and professional perspectives. In the negotiation between the external information and the internal assumptions, new meanings emerge from which imagined solutions or projects may arise. Clothes (as artifacts) result not solely from operational choices, but from designers (and consumers) imaginative enquiring, or '...re-creative reading of reality...' (Barrena, 2013). To meet the expectation for novelty, fashion design incorporates a 'seduction element' to stir emotion, to involve with meanings and stories into otherwise merely functional products (Lipovetsky, 2002), 'humanizing' them to anticipate and to meet human desires and needs, even before they are acknowledged by the average consumer. The creativity and imagination principle are then projectual and foster a process that perceives and interprets the world to materialise the imagined alternative. As Lawson and Dorst (2009, p. 38) emphasised, creativity in design develops and evolves between the problem understanding (analytical) to formulating solutions (creative).

Creativity in design is an 'image-in-action' process, i.e., to project through imagination, the reasoning that will guide the acting, the materialization of ideas - it is 'the mind seeking realisation' (Folkmann, 2010b). Data science and analytics will be the force behind industries, systems, and processes, which might change the product life cycle and creative process in fashion design. How to create far from the fashion's planned obsolescence, to extend fashion product durability and reintroduction into the productive chain? Fashion designers' creative and imaginative processes will need to understand materials, processes, and creation from a molecular and systemic perspective. Resorting to 'emotional data analytics' technologies (Bolton, 2010), fashion designers will need to learn to identify personal tastes and improve product design by knowing the full (re)living potential of a product or a collection. This will create a much more personalised approach to the fashion supply chain and to fashion design, producing to small segments and avoiding storage. It will alter fashion traditional segmentation process.

The Collaboration and Communication principle

In the complex fashion global dynamics, multiple and specialised sectors and teams work together in a systemic manner to meet activities, decisions, or processes. However, in education, it still predominates the single talented fashion creator, with original 'masterpieces. The collaboration and communication principle understands fashion designing as a team of diverse and dispersed professionals *(shared minds)* working coordinated producing innovative and creative outputs. The digital acceleration and the increase users' adoption of digital technologies, enhanced uncertainty, mistrust, misinformation, and lack of transparency, which led to the need for trustworthy sources. Social media platforms, for instance, help corroborate information and different perspectives through recommendations within communities formed by shared values. This also enhanced the collaborative and shared behaviour, in which creativity is no longer individual, but shared and explored together. So, fashion design learning needs to happen collectively and collaboratively to share experiences and resources. If creativity is a social phenomenon (Folkmann, 2010a), then learning enrich by social and cultural diversity and by heterogeneous and divergent opinions. Finally, this principle also acknowledges co-creation and co-authorship, under a constructivist perspective, and fosters participative and collaborative learning paths. Learning occurs in connected and borderless communities that share knowledge and skills, and built a common inventory of resources and ideas, explore, and reflect upon projects, contribute as peers, assessing, negotiating, and improving individual and group autonomous capabilities. In the individual level, although 'negotiated' collectively, fashion (i.e., material dimension) establishes a special relation between individuals and their bodies, where there is a space for (re)creation and (re) interpretation, for self-

constructed meaning, which not only is unique but also surpasses, legitimately, the design primary intent. In this sense, fashion design consumers are also "active producers of fashion" (Kawamura, 2020, p. 123), since they interfere, reinterpret, share, opine and influence the tastes and styles. More than ever, collaboration will diminish the barriers between the designer – user. Finally, the collaboration and communication principle assume the communicative value of fashion design as an encoding/decoding process itself. In the representational process of products forms and functions, communication is crucial when engaging with resources, tools, and materials, when executing study of colours, materials or creating mood boards, when documenting through sketches, writing, or digital files and when producing spec sheets or prototypes.

The Complexity and Uncertainty principle

Fashion relates to global and local systems, with fashion cities located all over the world and with "information spread from various locations through multiple media sources at an amazingly fast pace not only vertically but also horizontally." (Kawamura, 2020, p. 5)

Fashion changing principle is only apparently inconsistent. The uncertainty aspect of fashion is somehow stabilised in cycles that prosper in complex and undefined scenarios. Fashion complexity also encompasses its inclusive and exclusive character, adopted, or rejected by a large group, and at the same time, expressing and influencing individual tastes. Fashion semantic sense is formed by a fragmented individualisation, each one freely constructing an individualised self to take part in the global setting, share and (re)interpret their experiences, styles, perceptions, preferences and opinions about products or brands. Values such as personalisation, customisation, heterogeneity, multiplicity, diversity, variability, originality, uniqueness, represent the supremacy of a complexity of individualisms, the promoter of the fashion ephemerality (Lipovetsky, 2002). The complexity and uncertainty principle understands that the changing nature of fashion assumes a 'steady uncertainty perspective', under which design professionals/learners will adopt a defying acceptance that will stimulate "to add something new to what we know" (Gibbs et al., 2013, p. 6). Learning in fashion design need to promote research motivated by "willingness to stay with uncertainty, unpredictability, doubt, questioning" (Bolton, 2010, p. 7). By acknowledging fashion design complex system, learning can harness the unintended changes that might occur during the design process (Schon, 1979), and prepare learners to adapt "(...) enables the identification of bifurcation points; recognises the effect of context on understanding phenomenon and developing action; and acknowledges the importance of human agency in change and action" (Hase et al., 2006, Developing Capability: Beyond Competence section). Fashion

design learners need to develop preparedness and flexibility capabilities for the next certain change. They need to know how to employ divergent and convergent processes, how to prospect alternatives, and to resort to the accumulated inventory of competences to propose innovative solutions.

The fashion design learning principles (FDLP) ensured to contemplate the fashion specificities in the collaborative learning model so that learning happens at a more connected, personalised, and meaningful level. Although the FDLP principles guided the construction of the model, they were not components of the model, but directives that grounded the organisation of the components of the model. While the model could be updated and adapted for each learning experience, the principles were fixed. The next chapter will present the collaborative online learning model for fashion design (COL4FASHION) with its components and subcomponents.

3. The model COL4FASHION

This chapter presents the rationale for the development and implementation of the model Collaborative Online Learning for Fashion Design (COL4FASHION), a result of the theoretical framework fashion design learning principles (FDLP). It also exposes the reasoning process that guided the organisation of model, the requirements and characteristics of its components and subcomponents so they could relate to each other and create a collaborative, prospective and personalised online learning experience.

3.1 Instructional design approaches

The construction of the components and subcomponents of the collaborative online learning model for fashion design (COL4FASHION) resorted to different approaches of Instructional System Design models (ISDs). Instructional design models (Donmez & Cagiltay, 2016) are plans, used to maintain, or reinforce existing situations, that can be more or less student-centred and goal-oriented, adopting different approaches to the role of the learner, the teacher, learning methods, learning objectives, assessments, and learning environment.

The implementation of learning technology in student-centred instructional design approaches, such as the Project-based Learning or Inquiry-based Learning methods, the Personalised Learning, the key principles for instructional quality in online environments (Margaryan et al., 2015, p. 79) or the Universal Design for Learning guidelines (Glass et al., 2013) presented ways to personalise the curriculum and assessment methods, making them more inclusive and accessible for different learners, considering "the implications of the technology on distance education theory and practice" (Blaschke, 2012, p. 61). They emphasised that technology could instigate problem-based, contextualised learning, activating previous competences, helping students to explore information and sources that are easily available, question and uncover new topics of interest, reflect upon their learning processes. However, these instructional methods were also competency-based, since the student's progression depends on the fulfilment of previous requirements, pre-defined by the educational institution.

Other instructional models contributed directly to build the components and subcomponents of the model COL4FASHION so it could be tested in a trial course unit. Although directed to informal or formal training programs, the Kirkpatrick Model 4-level evaluation of learning outcomes[42] Hauser et al. (2020),

42 The Kirkpatrick Model 4-level are: participant's reaction, competence acquired, shared experiences and behavioural changes in professional settings, and the impact of the learning results in professional settings.

(Hauser et al., 2020) helped implementing assessment of learning results. The cyclical structure of the Kemp Instructional Design nine stages model (Obizoba, 2015), the Integrated Course Design (Hoefle et al., 2020) and the Successive Approach Model, SAM (Jung et al., 2019) reiterated steps (evaluate, design, develop), contributed to organise the learning components and subcomponents of the model COL4FASHION in an interrelated manner. SAM model backwards design approach[43] focuses on the delivery of the content and pre-defined outcomes (competency-based learning). However, it also helped to separate products (activities, materials, and resources) into processes of learning (the learning experience) and to define negotiable or non-negotiable requisites for the learning components and subcomponents for the model COL4FASHION.

Still, these models were teacher-centred and goal-oriented, pre-defining the learning components solely under the institutional/teacher's objectives and not involving the learners in designing the instruction. While SAM or KEMP models organise learning components to meet pre-defined learning outcomes, the SIDE model (Students, Instructors, Design, and Experiential learning), for instance, places learners in the centre of the design process, and acknowledges the negotiation of the learning, allowing more flexible curriculum and learning paths (Belt, 2014).

3.2 Heutagogical instructional approach

One of the most important aspects when implementing the model COL4FASHION in an online environment was to resort to theoretical perspectives that could accommodate learning in fashion considering its complexity and cross-disciplinarity, its constant need for innovation and creativity, and its fast-paced process to respond to the market's high demand. So, the previous instructional design methods were further analysed in the light of the heutagogical approach, to identify how they could help to improve the personalisation, flexibility, and collaboration strategies to implement the model components and subcomponents.

First it is relevant to reinforce that Heutagogy does not discard the need for a curriculum, outcomes of learning, or methods of assessment. But it organises them flexibly, coherent with the technology immersive environments of the digital era (Blaschke, 2012; Hase, 2015a; Thakur, 2017).

43 Backward Design is a framework for designing courses and content units developed by Grant Wiggins and Jay McTighe in their book Understanding by Design. It presents three stages: 1) the instructor identifies desired results, or the learning goals of the lesson, unit, or course, from the lower or broad information to the important and enduring understanding related to the topics. 2) determines acceptable evidence students must provide and define assessment methods. 3) plan the learning experiences and instruction, with instructional strategies and learning activities to achieve the learning goals.

Instead of controlling and limiting the learning experience, Heutagogy's self-determined approach puts the learners at the core of the instructional design process empowering learners' role in choosing their learning pathways, enhancing the combination of left and right brain thinking (double-loop learning). Design and Heutagogy approaches are respectively human-centred and learner-centred, acknowledging designers as 'agents of change' and self-determined learners and in this sense, Heutagogy and Design Method presented important similarities, helpful in the development of the model COL4FASHION. Design and Heutagogy promote change, i.e., the improvement of reality, through a reflective thinking capability. While questioning, participating, and intervening, individuals/learners reflect critically about their process of self-improvement (lifelong learning). Both Design and Heutagogy are context-driven and acknowledge uncertainty and complexity of problem-solving situations, stimulating individual capability to self-organise when facing changes and to construct knowledge in a non-linear manner. In the Heutagogy Instructional Design (Blaschke & Hase, 2016) the process is learner-generated, starting by identifying and negotiating learner's expectations and needs in terms of the content, learning outcomes and assessment methods. During the learning experience, different resources and collaborative strategies promote agency and autonomy, stimulating learners to explore, question, build personalised and contextualised pathways through self-reflection and peer feedback. Finally, the assessment is collaborative and continuous, to evaluate concepts and processes instead of retain information and present expected results.

3.3 Building the collaborative online learning model for fashion design (COL4FASHION)

The main challenge when constructing the model COL4FASHION (Figure 6) was to rethink the instructional design process to respect the specificities of the fashion sector and enhance learning as a process, with the learning experience starting with learners' interests around relevant fashion design problems or topics to form a learning community, virtually connected. Blaschke (2012) resumed the key requirements of the learning to support a learner-centred approach. First, the learning contract, in which learners negotiate "how, when, where and to what upper (rather than minimal) level they want to take their learning" (Hase, 2009, p. 47). Second, the flexible curriculum, topics that advance through learner-directed questions and negotiated assessment, the last requirement.

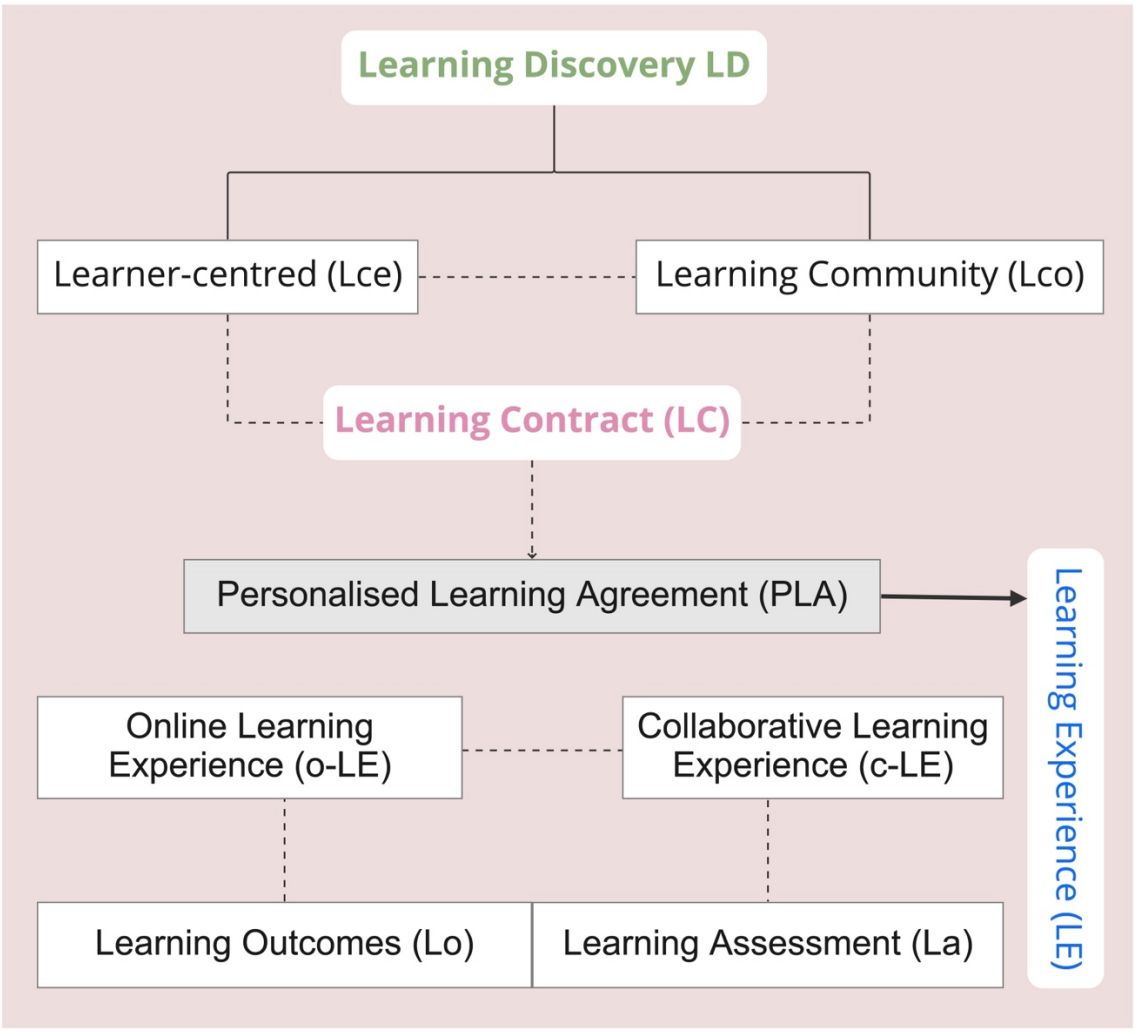


Figure 6 - The collaborative online learning model for fashion design (COL4FASHION)

Based on these heutagogical requirements, it was possible to identify the following requirements of the model COL4FASHION components and subcomponents:

- remain faithful to the learning principles (FDLP) defined in the theoretical framework.
- organise the learning environment to create collaboration among learners, surpassing limitations of time and space.
- establish a meaningful and contextualised learning experience to accommodate the personalised expectations of learners with multiple backgrounds.
- stimulate fluidity between learning/professional environments, recognising the professional and academic competences.

- meet fashion design specificities, and take advantage of its technological acceptability, its need for connectivity and its natural impermanence, to foster a prospective learning experience that can be useful and rapidly absorbed by the learners and the companies.
- the learning components and subcomponents of the model can remain the same, but organised and negotiated differently, depending on the specificities of the course unit, or learning program.

The requirements presuppose a model that is flexible to accommodate a wide range of subject's fashion design entails and prospective instead of responsive, continuously researching for future competences. The model respects national educational directives[44], and takes into consideration the trends in the socio-economic, technological, environmental contexts. But it incorporates learning experiences that arise from the learner's interests or from the companies that bring genuine problems, needs, and gaps. Learners, learning institution, content creators, and the personalised learning manager (PLM) characterise the stakeholders, with relevant contributions to the components and subcomponents of the model.

Learners

In the model COL4FASHION, 'learner' and 'learning' were used to indicate a more active, adult role, under the heutagogical, lifelong perspective (Eberle, 2013) and related to the higher education scenario. Learners navigate between the job market and the educational field; they are the ones that learn and use the gained competencies in the job market. When testing the model, learners were expected to:

- read the documents available and understand the learning components of the course unit and the conditions for the negotiation of the Learning Contract.
- negotiate the learning components and elaborate the Personalised Learning Agreement (PLA), sign and upload it on time.
- try (individually or collaboratively) to achieve the institutional learning goals and the learning outcomes.
- maintain truthfulness to the Learning Contract.

44 Instead of looking into the current job market to decide on their offer, the offer should 'listen to the users (learners and market)' and investigate the future developments to base their decisions.

- assume a proactive and responsible attitude for the learning experience, by developing a weekly schedule, showing the number of hours dedicated to independent study and scheduled activities and meetings.
- engage as much as possible with the learning community, providing feedback and resorting to its expertise to improve the learning experience.

Learning institution

It has an active and prospective role in observing, researching, synthesising future knowledge and skills (competences), converting it into a flexible and broad learnable content, with a credential or a certification[45]. In an heutagogical learning environment, educational institutions:

- assume a strategic, continuous research perspective on future learning competencies, with updated learning offers, more connected to the market.
- negotiate and combine learners' and company's needs through the negotiation of the learning experience.
- provide the competences and ensure that learners can apply them in different situations.
- adopt learner-centredness, in terms of both learner-generated contexts and content.

Content creators

Teachers and academic members, as 'learning designers', convert the researched information into learnable offerings (materials, programs, courses, units). In close contact with techno-socio-economic agents (industry, designers, businesses, and brands) they understand the reality and prospect future learning paths. Learners can also expand the core content and act as content creators.

The personalised learning manager (PLM)

The term 'facilitator' in Heutagogy, designates a mentor or a coach. The model COL4FASHION adopted the personalised learning manager (PLM), a negotiator of the learning process. The PLM prompts the dialogue between learners and teachers through the learning contract, ensuring that the learning principles (FDLP) are implemented in the learning experience. Furthermore, the PLM:

45 The model can combine credentials and certificates. Credentials forms immediate and specific learning paths (groups of competences) to be incorporated in the job market. Certificates validate middle or long-term programs (by areas of knowledge, for instance), in a prospective learning approach, about problems or issues that will come in the near/middle future.

- provides guidance and clarify information, as well as resources and materials to support projects and expected outcomes.
- negotiates the Learning Contract and ensure that learners are faithful to it.
- ensures that the learning experience respects the Learning Contract and activates the FDLP principles.
- manages the Learning Contract (and Personalised Learning Contracts, PLA) with teachers and sign the learning certification/credentials.

The Basic Design Cycle (Van Boeijen et al., 2013) helped convey the model COL4FASHION as a provisional solution that needed further confirmation. Specifications and criteria for the model implementation in a trial course unit, helped evaluate it against the initial requirements. It also helped define the reasoning (why) and by which means (when, what, where, which who and how) the learning components and subcomponents of the model COL4FASHION would interact to create a collaborative, prospective and personalised learning experience (Appendix A, Table A1).

3.3.1 COL4FASHION - learning components and subcomponents

Before detailing the learning components and subcomponents of the model COL4FASHION (Appendix A, Table A1), it was important to establish the perspectives of the model on the learning content and the institutional learning goals.

Defined by the course or programme and following institutional strategies, learning contents are external contribution to the model. Learner-centred and non-linear learning content aimed to provoke questioning that evolve under the premise "this is the topic, go on and explore it, compare it, contextualise it, test it, create from it". This perspective considers learners competent to converge and diverge the focus of the content while learning, since they already have knowledge and skills about the issue or part of the issue. It adopts the semiotics/design critical thinking approach to learning, from an investigative and autonomous perspective, which might extrapolate the initial content.

Similarly, the learning goals relate to the institutional strategies and their social commitment to education. As such, they express the institutional aims for a particular course unit (or a program), maintaining the equity, and keeping true to the institutional scope. Elaborated to accommodate the complexity and nonlinearity of cognitive processes, learning goals embraced a holistic perspective avoiding a unique correct way to learn. The Learning Contract described the learning goals (LG) in broad concepts, as 'new knowledge' or 'deep understanding' to be acquired (Obizoba, 2015), giving opportunities to learners autonomously research the framework they want to adopt.

3.3.1.1 Learning Discovery (LD) component

Anchored in the theoretical framework, the Learning Discovery component (Dick, 2013), and subcomponents learner centred (LCe) and learning community (LCo), aimed to prepare the learner to negotiate the Learning Contract (LC) and activate the learning principles (FDLP) of the model COL4FASHION (Appendix A, Table A2). The learning process starts by identifying the learner's expectations and needs, accordingly with the heutagogical and the design process perspectives. It was an introductory phase that could be implemented in one course unit, such as the one tested in this research, or be transversal to different course units. In the model COL4FASHION, the Learning Discovery (LD) also presented information about the trial course unit and the learning platform and introduced individual and group activities contextualised within the fashion sector. The role of the PLM (personalised learning manager) was to incentivise high-level questions and present research suggestions. Rather than focus on content acquisition or compliance with the learning goals, the Learning Discovery (LD) component motivated new fields of interest, new ideas or inputs.

The learning community subcomponent (Lco)

The subcomponent had two goals. The first one was to help learners form a learning community and know the learning model. The learning community subcomponent (Lco) helped learners meet and socialise, creating trust and connectivity, and a sense of belonging. Especially important in an online environment, even micro-communities of learners with different levels of competence and perspectives, could enhance contextualised learning and reinforce individual motivation to resolve the activities. Therefore, the second goal was to identify individual and collective interests (common goals) about the course (what was relevant to learn) and about fashion topics. On the individual level, the learning community subcomponent prepared learners for self-determined learning and helped validate globally available knowledge (Blaschke, 2012, p. 66).

The learner-centred subcomponent (Lce)

The learner-centred subcomponent focused on recognising learners' previous experiences and competences, their difficulties, strengths, interest about the topics (flexible curriculum) and their expected outcomes, aligning these with institutional ones (Dick, 2013, pp. 40-47; Hase, 2013). Since not all students might be prepared for self-determined learning, this subcomponent also worked as an advising process to prepare for the negotiation of the learning. The heutagogic learner-centeredness

principle was activated and maintained throughout the learning experience, promoting human agency, self-motivation, autonomy, and self-determined learning.

3.3.1.2 Learning Contract (LC) component

As a strategy of negotiated learning, in the case of the model COL4FASHION, the Learning Contract (LC) component worked as a tool to achieve the heutagogic principle of personalised learning. When implementing this component, there were two aspects to consider (Appendix A, Table A3). The first aspect was that learning contracts might not be suitable for all types of learners or for new content, since learners cannot identify what they already know or what they need to focus on (andragogical perspective of Knowles[46]). So, under the heutagogical approach, the learning contract needed to present standard elements, but be flexible enough to adapt to different learning pathways and type of learners (Anderson et al., 1998; Blaschke, 2012; Boyer, 2003; Gilbert, 1976) Hence, the model COL4FASHION previewed the standard learning contract and moments of calibration[47], during or at the end of the learning experience. The second aspect was that although learning contracts allow learners to negotiate how and where they learn (Belt, 2014, p. 178), the academic quality of negotiated learning needed to be respected. Therefore, in the model COL4FASHION, the negotiation of the learning contract aimed to balance the learners' objectives and institutional goals, to align or anticipate the course outcomes with professional sector, to maintain the equity between courses in different 'years or entries', and to remain truthful with the institutional strategies and commitments with society.

The Learning Contract (LC) was an independent learning component that bridged the Learning Discovery (LD) and the Learning Experience (LE) components. In the trial course unit, the personal learning manager (PLM) prepared the Learning Contract as a document (Appendix B), that contained the *syllabus*, detailing the learning content, resources and strategies, workload, as well as learning assessment and learning outcomes (results or evidence). It also described mandatory and negotiable fields (NLC) of each learning component/subcomponent, based on limits to negotiability in accordance with Dick (2013, p. 40). Negotiated between the learner (Appendix B, Table B1), the PLM (personalised learning manager) and the higher education institution, the Learning Contract (LC) generated the

46 Malcolm Shepherd Knowles, American adult educator, famous for the adoption of the theory of andragogy (a term coined by the German teacher Alexander Kapp).

47 Assignment D7P2.2_'PLA calibration' - through an individual meeting or delivering a brief report D8_5_Self-assessment, so that learners could adapt the Negotiable learning components and subcomponents (NLC).

subcomponent Personalised Learning Agreement (PLA) as exemplified in Figure 7. Within the model COL4FASHION, the PLA represented a subcomponent of the Learning Contract (LC) component that allowed learners to reflected on their practice, plan their future, and take responsibility for their learning (Anderson et al., 1998).

Figure 7 - example of a Personalised Learning Agreement (PLA)

Requirements for implementing the Learning Contract (LC) component

With flexible openings to allow the negotiation, the LC presented the following mandatory requirements:

- Discussed institutionally to keep the alignment with institutional mission, ensure equity between courses and programs and respect the learning goals.
- Discussed (continuously and in advance) with the learning and extended community (socio-economic agents) to keep true to the market/professional sector.
- Remain true to the model COL4FASHION learning principles (FDLP).
- Redacted by the personal learning manager (PLM) who presents it to the institutional board for approval.
- Reviewed at the end of each learning experience and discussed with learners to allow relevant issues to arise from their experience as learners and professionals.
- Informed the conditions of negotiation for each learning component and subcomponent.

3.3.1.3 Learning Experience (LE) component

The Learning Experience (LE) component had four subcomponents: collaborative learning experience (c-LE), online learning experience (o-LE), learning outcome (Lo), and learning assessment (La) expected to activate all five principles of the model COL4FASHION, sustained by the theoretical framework[48] (Appendix A, Table A4). The Learning Experience (LE) component resulted from the negotiation of the Personalised Learning Agreement (PLA) and happens as learners are critically involved in iterative cycles (loops of learning) of analysis-synthesis, simulation-evaluation, from the initial ideas to the learning outcomes (Van Boeijen et al., 2013). The role of the personal learning manager (PLM) is to challenge learners (Blaschke & Hase, 2016; Dick, 2013, p. 47) to manage and develop their projects and reflect on the learning processes, supporting their autonomous skills. The o-LE and c-LE subcomponents reflected the relations created between learners and the learning community in the online learning environment through the activities, resources, materials, and tools.

The Collaborative, Online Learning Experience (c-LE and o-LE) subcomponents

It was not possible to create a collaborative learning experience (c-LE) in online environments without the online learning experience (o-LE). This meant that the activities, materials, resources, and tools (provided by the institution or brought by the learner) and the learning platforms, played an active role (self-efficacy, and self-determined learning), in designing an open, flexible, exploratory learning experience. The o-LE would not only support c-LE but promote a constructivist process of learning, that is occasioned by the learner (Hase, 2009), while exploring varied resources and methods necessary to deliver appropriate solutions (Moggridge, 2008).

The learning community and extended community, connected through information and communication technologies, promoted a collaborative learning experience (c-LE), supported by the online learning experience (o-LE). To develop their projects, solve a problem, learners resorted not only to the acquisition of knowledge and skills (through the content) but to the competences of the community, to different expertise, to the internal learning community and the external, professional community (from each learner's network). The o-LE provided the conditions for embracing complexity and uncertainty, as

48 Capability-learning and agency, achieved by collaborating, contextualising, and exploring. Self-reflection metacognition and double loop learning through deep learning, reflectiveness and questioning. Learner-centred and learner-determined, instigating autonomy, and individualised learning. Nonlinear learning, aligned with anticipative thinking and decision-making attitude (agency) in a lifelong learning perspective.

projects are constantly evolving (Proni, 2006). Flexible content could expand with current or urgent issues, or experiences from the professional space (reframed and contextualised), approximating learning from non-formal and non-linear settings and creating 'breaks in learning', stimulating new knowledge to emerge. Finally, the o-LE allowed dynamic loops of learning (Phelps & Hase, 2002), new learning pathways and at the same time helped learners identify individual knowledge and skills (competence), expose the learning journey (e.g., Reflective Learning Journal) and reflect on the way they learn, while questioning their values and belief systems.

Learning Assessment (La) and Learning Outcomes (Lo) subcomponents

Two heutagogy principles helped to organise the learning assessment and learning outcomes subcomponents of the model COL4FASHION (Appendix A, Table A5). First, considering the assessment as an act of learning and acknowledging that learning can occur by trial and error. This relates with the nonlinearity of the design process, in which results are not definitive or repeatable, but contextualised. "The illusion is that there is a link between the assessment outcome and actual learning. An assessment driven system focuses on content, knowledge and skills and doesn't go beyond application in its outcomes" (Hase, 2015a, p. 1). Learning assessment, under the design and heutagogy approaches, stimulated the reflective practice (Schon, 1979), required to face complex, uncertain situations. Therefore, establishing solid learning outcomes to be measured by a specific set of learning assessment procedures (competency-based assessment within a pedagogic approach), would exclude any possible additions or changes to the initial plan, leaving no room for unfinished or mistaken learning, for innovation, creativity, and prospective thinking (Das & Mathew, 2019; Harvey et al., 2019; Kincade et al., 2019). The second heutagogical principle considered that if the learning assessment is built-in to the learning experience, then the self-determined learners get involved in assessing their learning. This presupposed that in the model, the learning assessment (La) subcomponent happened at the community level (social learning) and at the individual level. The learning community provided guidance and constructive feedback (Jiao & Lissitz, 2020). The learning community triggered individual strategies of self-reflecting, recognition of acquired knowledge and skills, change on mindset and self-assessing capabilities. So, learners resorted to each other not only to understand the content but to measure and negotiate different points of view, difficulties, accomplishments, making them more aware of their individual learning processes.

To identify cognitive levels for the learning outcomes (Lo) subcomponent, without disregarding that each project might require different cognitive levels of knowledge, this model resorted to Bloom's revised

taxonomy[49]. Bloom's approach can accommodate a constructivist approach acknowledging that learners can build knowledge while exploring meaningful learning paths, comparing new information with old ones, and using different cognitive processes to understand and manipulate the information (Fields et al., 2006; Hoefle et al., 2020; Krathwohl, 2002, p. 3).

Implementing the heutagogical learning assessment (La) subcomponent

In traditional instructional design, learning assessment methods, defined to comply with pre-defined learning outcomes, generate evidence of competences that learners should master. This sufficed to assess the knowledge and skills acquired in that setting, which might not be useful in novel circumstances. But "assessment in a heutagogical context becomes a metacognitive aspect of the learning process" (Booth, 2014, p. 69). Capability-based assessment is less linear or defined and under the heutagogical (and design) perspective (Booth, 2014) self-determined learners can assess their learning and manifest honestly about the results achieved. Therefore, the model COL4FASHION focused on learner-centred formative assessment, evaluating the evidence of learning before, during and after the learning experience, including summative assessment strategies (Appendix A, Table A5).

The Summative Assessment

The summative assessment, evidenced by the deliverables, might change since different course units might require different outcomes, deliverables and thus a different grading system. The summative assessment reflected or materialised the approaches adopted for the formative assessment and considered criteria of negotiation (expressed in the Learning Contract) of some elements, such as the weighting system and the type of deliverables. When implementing the trial course unit, the Learning Contract informed the Assessment Categories and Assessment Types[50], which guided the definition of the assessment activities.

49 The "Bloom's Taxonomy of Educational Objectives" published in 1956 was later revised by Lorin W. Andreson and David R. Krathwohl (2002) differentiating between "knowing what," the content of thinking, and "knowing how," the procedures used in solving problems.

50 Adapted from UK KIS record 2016/17 - Calculation of assessment methods and learning and teaching methods | HESA, the Higher Education Statistics Agency.

The Formative Assessment

The formative assessment, integrated into the learning experience, presented activities organised in the five parts of the trial course unit, designed to observe learners' performance, while completing them (Eberle, 2013).

To follow the learner's performance, the formative assessment needed to respect and activate all the principles (FDLP) of the model COL4FASHION, throughout the learning experience (Appendix A, Table A6) following the Formative Assessment Rubrics (FARs): negotiated, self-reflective, collaborative, and non-linear.

The negotiated assessment rubric

The rubric accommodated professional profiles while respecting the academic and the course unit goals, expressed in the conditions of the negotiation in the Learning Contract. The conditions of negotiation ensured the assessment equity among learners in different groups. Learners determined where they need to focus their learning, contextualising the learning assessment, defining how they want to be assessed (self-reflective rubric) and the level of achievement they aimed (Fields et al., 2006).

The Self-reflective assessment rubric

The rubric entailed a developmental process of self-reflectiveness stimulated collectively by the learning community (collaborative assessment rubric) and needed to promote deep changes at the cognitive levels. It presupposed iterative processes of learning, continuing questioning of acquired knowledge and skills (double-loop learning) and greater responsibility in the learning and assessment process (i.e., group discussions, peer feedback, self-diagnosis on the acquired knowledge, self-reflection journals that recorded learning process and results, and self-scoring activities) (Blaschke, 2012; Eberle, 2013; Hase, 2015a).

The collaborative assessment rubric

In a constructivist learning experience, learning develops while learners learn from each other, from different perspectives and experiences. This rubric brings the learning community to the assessment strategies, as it can provide critical and constructive feedback which might influence intermediate results.

The non-linear assessment rubric

Self-determined learners are "innovative, creative, able to research and sift information, willing to embrace change, flexible, skilled learners, reflective, confident, collaborative team players, and have high-level relationship skills" (Hase, 2015a, p. 2). Instead of measuring fixed learning outcomes, this rubric prepares learners for complex and uncertain scenarios. It helped learners assess the achieved results of their problem-solving processes and reflect how the knowledge and skills (competences) would apply to new challenges capability-based learning.

Implementing heutagogical learning outcomes

First, it was important to differentiate between learning outcomes and learning goals or learning objectives. While learning goals and objectives describe the aims of the course or the program, learning outcomes describe what learners will know and/or be able to do after having completed a course in an observable and measurable manner.

In teacher-centred and traditional models of education, the learning process starts by defining precise and clear learning outcomes, pre-defined course content and predetermined learning assessment methods. When learning outcomes centre on the knowledge and skills that students needed to demonstrate at the end of the learning cycle, they are pre-defined by the institution/teacher and support the course program objectives, assessed by methods and criteria defined in the course/program. But if learning outcomes are built to meet the teacher or instructional goals, how can it measure the learner's capability? This predicts learning outcomes to rely on meeting specific and initial conditions, which may not be present or that may change during the learning experience. It cannot measure learning capability, or the learning that goes beyond that learning experience, 'what it will be'. Admitting that learning outcomes are what learners will learn, then they should have a say on results to be achieved and thus, get more involved in designing their learning outcomes (learner-centred perspective), negotiating the measurability procedures and the methods to assess them.

The main challenge when implementing the learning outcome (Lo) subcomponent was to make outcomes flexible and personalised and yet coherent with course, programme, and institutional values. So, the model COL4FASHION defined a set of premises for the implementation of the learning outcomes component, that considered the competence-based learning (achieved knowledge and skills valid for that specific course) but valued the capability-based learning of the heutagogical/design-led learning approaches (Tables 5A and 6A).

- By negotiating the learning outcomes, learners recognise themselves as capable of prospecting and planning the expected results. “What learning outcomes would you expect, need, want to achieve, that can be considered a success for you, after completing this course?” (Blaschke & Hase, 2016, p. 30).
- Follow the conditions of negotiability explicit in the Learning Contract, that identified negotiable/mandatory aspects (Dick, 2013; Van Boeijen et al., 2013).
- Organized in ‘broad concepts’, and higher levels of understanding (Krathwohl, 2002; Obizoba, 2015)
- As the design process, goal-oriented outcomes are prospective and expected, not pre-defined or decisive. They are emergent preferred ones (Schon, 1979) and part of the learning experience, open to learners explore, and enhance (Eberle, 2009; Van Boeijen et al., 2013).
- Higher cognitive learning outcomes (Analyse, Evaluate, Create, in accordance with Bloom's revised taxonomy) to provoke learners to research autonomously, encounter and apply the knowledge and skills required to resolve problems, judge, and experiment, instead of accepting without questioning (Krathwohl, 2002).
- Measured through reliable instruments and coherent criteria of assessment.
- Respect the five principles of learning in fashion design (FDLP).
- Present opportunities to generate new questions and challenges helping the course constantly update (Hase & Kenyon, 2013; Hase et al., 2006).

4. Research methods

Having started this research project before the Covid-19 pandemic, it became evident that the research was in the "right track". The motivation was to explore educational models adequate to the fast-paced, complex fashion sector, to be implemented online, resorting to digital and collaborative technologies, facilitating timely access to different levels of information and expertise. Therefore, the aim was to develop an online learning model that allowed the learning community (designers, consumers, learners, companies, brands, etc.) learn/work systemically, without geographical limitations, sharing and storing relevant resources, adapting quickly when facing diverse markets, and speeding up the diffusion of knowledge in the sector. This model, presented in Chapter 3 as the collaborative online learning model for fashion design (COL4FASHION) tried to respond some of the gaps identified in the Literature Review and in the exploratory research.

The review of the literature ran together with broad exploratory research about fashion design education in the European Higher Education Area (EHEA), which helped the problem framing, the research questions, and the research goals. While the Literature Review examined academic and market studies, projects and examples, the exploratory research selected and studied fashion design programs offered onsite and online by accredited higher education institutions (HEI) and conducted questionnaires with fashion professionals to confirm their perceptions on the topic (fashion design higher education). The combined primary and secondary approaches of the preliminary study contributed to understand and contextualise the problem, confront the data, uncover concepts and perspectives, reveal, and confirm gaps and test methodological methods and techniques.

This chapter summarises the findings of the Literature Review and introduces the methodological strategies used to implement the model COL4FASHION into a trial course unit. It explains the sampling process and presents the instruments of qualitative data collection used in the observation period: the prototyping method and the observation script. It also characterises the focus group that collected the opinion of the participants at the end of the observation period. It concludes presenting the instruments of data analysis, built to examine the information collected during the observation period of the trial course unit.

Findings from the Literature Review

The first gap recognised the Literature Review, also evidenced in the exploratory research, was not new or unexpected. It related to the very complex, global, and forward-thinking nature of the fashion sector, and with the stagnated, traditional, and responsive strategy adopted by fashion education. While education perspectives comply with national regulations, which slowly respond to socio-economical needs, in the fashion design process (cycles, trends and project development), fashion brands, companies, designers need to innovate, anticipate the changes in consumer behaviour and accept evolving technologies to ensure competitive advantage. In this context, fashion designers are part of a highly connected, technological, global community that (re)creates, follows, shares tastes, brands, and lifestyles. Although fashion designers can assume the responsibility for developing an entire collection or clothing line, often they handle only a part of it working for different brands or integrating teams of specialists with different expertise or specific knowledge. But, instead of educating capable professionals to work in heterogenous teams, with innovative thinking to push the change in the sector, fashion education continued replicating a model of designing, producing, consuming that was outdated, valuing fashion designers as highly individualistic (Onur, 2020), designers in a bubble (Berk & Wallinger, 2019) or "blessed creatives", with talent and intuition to materialise their ideas.

This vision connects with the fashion atelier, and with the clothing manufacture process, with "the making" of an idea created by the designer and that requires engagement with materials (shapes, textures, dimensions, etc.) and equipment (i.e., sewing machines). Well-established fashion education programs and institutions employ this perspective efficiently, but this was not the fashion design perspective required to make the sector move forward. This became clearer by the need of improvement in fashion's environmental and ethical performance and even more clear during the Covid-19 pandemic, and the initiatives in the aftermath[51], which forced a questioning of fashion materiality associated with the physical atelier as the unique pathway for producing or learning fashion design.

This was the second gap highlighted in the literature review. Although materiality and instrumentality are part of the fashion design process, this research adopted a semiotic perspective in which fashion

[51] A recent example, which proves the need for further studies in fashion design education was the *Multilogue on Fashion Education. What kinds of fashion education are needed NOW?* that happened between 1 and 2 of October 2021. Digitally delivered the conference "focused on the learning and teaching of fashion at tertiary level... to explore and illustrate the diversity and complexity of the field and the practices of fashion education." Source: https://hopin.com/events/the-digital-multilogue-on-fashion-education-4dc1272e-1f85-4602-81a8-2008dd18ac45/registration

accomplishes its full meaning, as artefacts of a decoding and interpretation, communication, and symbolic process of design. The semiotic approach permeates the process of fashion design development *(semiotica del progetto*), through the entire ideation, creation, implementation activities, focusing on developing reflective, prospective thinking, and construction of knowledge. Under this premise, fashion designers are social decoders, who create new relations, through fashion objects, which the wearer will interpret again, in a semiotic process. So, if fashion design process involves the interpretation and decoding of the contemporary phenomena, as an aesthetically meaning-making process of converting the researched information into contextualised and coherent fashion products, the approximation between fashion design education and semiotics methods, perspectives and pathways seemed a valid approach to adopt in this research.

The third gap surfaced during the exploratory research of higher education programs in fashion design. As emphasised in the exploratory research and in the Literature Review, fashion figured among the biggest eCommerce segments worldwide, with an active and interactive digital presence of fashion brands and professionals, consumers, and students. However, the online, digital, virtual offer in fashion design higher education was limited or non-existent. And the ones existent, although considered important initiatives, transposed the traditional "onsite" model of learning (with lecture-based teacher-centred approach, and curricular structure or assessment mechanisms determined by the program or the institution). Most examples studied reproduced pedagogical standards, leaving fashion design education misaligned with the needs of heterogeneous professional groups, with current and future requirements of the market and industry.

Confronting data about foresee changes in technology with data about fashion design higher education in Europe, the education sector was missing the technological ubiquity and mobility, the flexibility and collaborative possibilities that defy traditional learning models, the personalisation of learning and the mixed role of the designer-consumer-learner altogether. What became clear during the disruptive period imposed by the Covid-19 pandemic was how teams ought to be constituted based on competence and ability to work with each other, not on their geographical availability or physical proximity. Fashion, as other sectors, had to adapt quickly, collaborate, learn, reduce time and costs associated with displacement, and ultimately break preconceptions related to fashion production (i.e., resorting to co-creation, or 3D technologies) and communication (i.e., virtual fashion shows). Traditional models of education, not prepared for the greater flexibility and lack of control of the online learning environment, had to accept it, dismantling initial and recurrent resistance about fashion design education in an online environment.

The literature review provided good examples and practices of distance learning during the imposed social distancing period, but overall, they focused on incorporating and testing technological tools, measuring the student's engagement, satisfaction, and completion rates. Although those initiatives were necessary and will certainly contribute to better approaches in online, digital learning, the educational model remained the same – teacher-centred and content-centred. Technology itself cannot guarantee that students or professionals would learn, engage, explore, collaborate, and create effectively in online learning environments. There is a need for more studies and discussion about the future of fashion design education as it became clear during "The digital multilogue on fashion education 2021: a conference on learning and teaching fashion in theory and practice"[52], held online and that reunited initiatives, projects, and fashion educators to present their experiences during the Covid-19 pandemic.

The fourth gap identified in the literature's review related to the pedagogical model of education, which imposes a certain way of creating and developing the teaching and the learning experience. Here, it seemed important to reinforce that it was not the focus or the goal of this research to propose a different theory of education. However, there was a need for a different theoretical support, more compatible with the specificities of the fashion sector and with the changes promoted by online, digital, virtual technologies in our daily lives and in education. The interest of this research was to know the opportunities to offer a student-centred, personalised, flexible, collaborative, and prospective fashion design education, using the online environments.

After the Covid-19 pandemic, education and fashion design education needed to change abruptly, from a reactive to an anticipative strategy not only following the rapid flow of an ever-changing technology-driven society but studying, anticipating, and proposing new forms of learning. The review of the literature revealed the urgent necessity of a body of studies on alternative models, processes, and systems for fashion design education in which advancements on collaborative, digital, virtual online technologies were a natural component. More than ever, fashion companies and brands must resort to computer assisted design software to develop patterns, for instance, or to 3D printing, that is challenging the concepts of consumer buying and/or "producing" their own fashion products. So, instead of educating fashion designers to become suitable for the current market, for the knowledge-based,

[52] Supported by the American university of Paris, the conference held on October 1st and 2nd 2021, aimed to respond: what kind of fashion education is needed now? what kinds of fashion education are needed to build a more inclusive, just and beneficial (fashion) system? what kinds of fashion educational practices exist, can we share to learn from each other, and can we build together? how can we turn our reflections into actions?

industrial, information-centred landscape, the literature research demonstrated the need for an alternative theoretical framework for fashion design education to prepare professionals capable of observe and reflect about the sociocultural, economic, environmental landscape and propose innovative processes in the design of fashion products.

Grounded in the Heutagogy, the self-determined learning theory, it was possible to elaborate a theoretical framework that, through a set of principles, supported the development of an alternative model for the fashion design higher education in online environments. Furthermore, Heutagogy shared epistemological similarities with Semiotics and Design theories, especially placing the learner/user at the core of the process.

4.1 The exploratory research

The exploratory research resorted to the divergent process to gather (new) knowledge about fashion design education, contextualise and frame the initial problem (the online offer in higher education). This led to establish the scope of the research, formulate the research questions, and determine the research design, sampling methodology and data collection methods. The exploratory research gathered information concurrently through the documental research from the review of the literature, as presented in Chapter 2. It also identified and characterised higher education courses in fashion design, onsite or online, within the European Higher Education Area. Questionnaires conducted with experts in the fashion field, contributed to uncover different perspectives about the fashion sector and fashion design education.

4.1.1 Characterisation of the fashion design courses

The identification, selection, and subsequent analysis of higher education courses in design or fashion design aimed to know the programme structure, the content, and delivery methods. It started in 2016, broadly including onsite and online models offered by universities, education institutes and other accredited organizations, worldwide. An initial set of criteria considered Design or Fashion Design areas in the top Universities, within Universities World Ranks[53], and their online offer. However, this approach proved overwhelming and ineffective. A new search tried to select Fashion Design Schools or Institutions worldwide and compare them with the Universities World Ranks. Still, the results were difficult to

[53] Times Higher Education World Reputation Rankings (THE). The Academic Ranking of World Universities (ARWU) released by Shanghai Ranking Consultancy. CWTS Leiden Ranking, released by the Centre for Science and Technology Studies. Quacquarelli Symonds (QS).

compare because of differences in the accreditation systems. Furthermore, Design courses and Fashion Design courses, associated with different schools (Engineering, Humanities, Arts, even Linguistics) made the comparison even more difficult. Fashion courses could adopt different denominations and approaches, from Fashion (and specialisations) to Clothing Design, Clothes Design or Design with specialisation in Fashion.

Universities and Schools, previously selected and researched within World Universities Rankings[54], helped to confirm if the institutions with fashion design programs appeared in the worldwide university rankings. The ranks selected presented specific data on fashion design schools and others design subjects or related areas within a specific university. Additionally, a search conducted in BoF[55] and CEOWorld rankings highlighted specific scores from the fashion sector, allowing a comparison with the previous search. A final version of this exploration procedure limited the search to fashion design courses within European Higher Education Area (EHEA). This approach provided a diversified and multicultural offer, internationally focused, with standardised instruments to guide the analysis. Although other countries and regions have emerged in the initial research, the in-depth analysis centred in France, Italy, and United Kingdom[56] educational offer in fashion design. These countries still maintain the economic, social, symbolic, historical, and cultural value, as well as the hegemony of fashion design creation, development, and production. Therefore, the analysis included accredited Higher Education Institutions or Art and Design Schools and Institutes, with the same level of qualification as per the European Qualifications Framework (EQF) and with notorious contribution for the fashion sector development. Documentary research in publications from public and official, European entities (Appendix C, Table C1), helped the information liability, making it possible to align a final set of five criteria: fashion design courses offered online by Higher Education Institutions (HEI), accredited by the regulatory agencies in BA/BA Hons and MA levels[57], with available information about the program structure, curriculum, or syllabus.

The initial and broader search identified 539 fashion, design courses, with other specialisations, delivered in traditional, onsite settings by HEI from the forty-nine (49) countries members of EHEA

[54] Data collected in 2017.

[55] Business of Fashion (BoF) is an informative platform, which discusses relevant topics about the fashion professional sector. BoF yearly fashion school rank considers the financial participation of the schools (73 in 2017). For this reason, BoF-Rank has been considered as complementary.

[56] Despite the withdrawal from the European Union in January 2020 (Brexit).

[57] In accordance with the Bologna's three cycles of study (1° cycle, 2° cycle and 3° cycle, based on learning outcomes defined by the Dublin Descriptors).

(Appendix C, Table C2). From these, 356 focused on Fashion Design and it was possible to obtain information from 309 programs in European or national qualification agencies.

Although Fashion education (and practice) comprised many areas of knowledge, from creative, technical to managerial ones, the research focused on fashion design[58], meaning the planning and development process fashion designers undertake to create innovative fashion products and original collections to a brand, or a market. From the courses searched, eleven (11) were online, three (3) were fashion design focused (in Italy and Kazakhstan) but only two (in Italy) presented information about the curricular structure and/or syllabus (in the institutional website and at the national accreditation agencies), allowing further analysis.

4.1.2 Exploratory questionnaires

The semi-structured questionnaires were the primary data collection method (Campenhoudt et al., 1995) used to collect the points of views of professionals and experts about the fashion sector in relation to fashion education. The questionnaires worked as preliminary instruments to identify inconsistencies or ambiguities before developing the final version used in the observation period. The valid answers from the exploratory questionnaires (Test 1 and Test 2) integrated the Q1_application form, used in the trial course unit. The questionnaires and poll, applied physically and online in three different moments (Table 3), gathered information from different professionals within the fashion sector: designers, business owners, educators, graduated students, sales representatives, trend experts, marketing, and communication professionals.

Table 3 Exploratory questionnaires

	Test 1		Test 2		FB poll
	Oct.2016	Nov.2016	Feb.2017	Sept.2018	May 2019
Online	2 responses PT	2 responses EN 8 responses PT			4 responses EN 6 responses PT
Onsite			36 responses PT	3 responses SP	

Online questionnaires generated spreadsheets (associated with a Google Account), allowing to organise and analyse the results, and improve the questions (Table 3). Physical questionnaires allowed to interview the professionals, writing, and recording the answers. The "2016 questionnaires" (Test 1),

[58] Areas of fashion not included in the study: management, marketing, business, promotion, journalism, history, and costume. Specializations in knitwear, kids wear or sportswear, tailoring, textile and printing, accessory, footwear, or jewellery.

applied with acquaintances, verified discrepancies in the questions. During the Modtíssimo[59] trade fair (Porto, Portugal) a second questionnaire (Test 2) revealed that the structure still needed revision. The revised version[60] collected the opinions of 3 Spanish fashion professionals *in loco*, during a work-related travel in 2018. Still, this structure proved to be error prone, difficult to respond (especially in the printed version, as the one used in February 2017), generating inconsistencies in the analysis. So, a final version ended up with twenty-four (24) questions (one consenting and three providing demographic information), reorganised the main sections, as follows, to accommodate direct questions and avoid the ramifications:

- Higher education, in fashion design.
- Professional occupation in the fashion design sector.
- Importance of competence update in the fashion design sector.
- Participation in complementary education/training, in fashion design.
- ONLINE education/training in fashion design.
- Value of education/training in fashion design.

Finally, a Facebook poll conducted with fashion professionals helped identify the subject to be used during the testing of the trial course unit. The poll had one question. Respondents needed to choose which subjects(s) of the fashion design higher education curriculum were core subjects and if those could be learned online.

4.2 The methodological choices

This section describes the operational stages of the research, which Marconi and Lakatos (2003) refers to as methods of procedure (2003, p. 106) taken to test the collaborative online learning model (COL4FASHION). This qualitative research followed different methodological approaches according to the information necessary to collect in the different phases of the investigation and generated rich, in-depth information (Campenhoudt et al., 1995; Carter & Little, 2007; Creswell, 2008; Creswell & Creswell, 2017; Rojon & Saunders, 2012; Roulston, 2019). While the inductive approach brought fashion design

59 The fair, organised since 1992, is dedicated to the Portuguese Textile and Clothing Industry and since 2016 is held in Porto's Airport.

60 The questionnaire had 47 questions, presented three sections. Sections 1 and 2 presented Yes/No and multiple-choice questions to characterise the interviewees in relation to their level of education in fashion and professional occupation in the sector (Business owner; Employee at a company or educational institution; self-employed professional). Section 3 separated the questions in different subsections, depending on the profile.

education closer to contemporary theories (adult education, continuing education, online education, educational technologies), the deductive approach considered online and collaborative learning valid to promote prospective and quality learning to different professional groups in the sector.

Before introducing the next sections, it was important to clarify the conceptual definitions used in the methodological procedure (Appendix E, Table E1). First, the concept of online learning, as a way of accessing and interpreting information via the Internet. More broadly, digital learning encompasses the use of technologies in environments, materials or practices and include, blended learning, virtual learning, mobile, e-learning. Finally, the perspectives studied in the theoretical framework instigated the use of the term learners instead of students, more aligned with the active role they play in the learning process and more aligned with the user-centred perspective adopted by the Design and Heutagogy approaches. Similarly, the term participants designated the sample that joined the research project and assume the role of learners in the trial course unit. Instead of teacher, tutor or mentor, the research opted to use the term personalised learning manager (PLM).

4.2.1 Instruments of data collection and analysis

The methods and instruments selected for data collection, organisation and analysis or interpretation of the information, aimed to provide information to the collaborative online learning model (COL4FASHION) and respond to the research questions. So, the instruments of data collection used depended on the information required and the sources available. The object of the observation, the online trial course unit, influenced how to produce, collect, and handle the information (Campenhoudt et al., 1995, p. 186). Hence, the Internet Mediated Research (IMR) not only seemed the coherent method of qualitative data collection and analysis, but it grounded the choices for other methods (de Souza et al., 2010): prototyping methodology, observational research, and focus group (Figure 8). The British Psychological Society defines Internet Mediated Research as “any research involving the remote acquisition of data from or about human participants using the internet and its associated technologies” (Hewson & Buchanan, 2013, p. 6).

This section starts by presenting the sampling choices, and next the methods of qualitative data collection, and data analysis approaches.

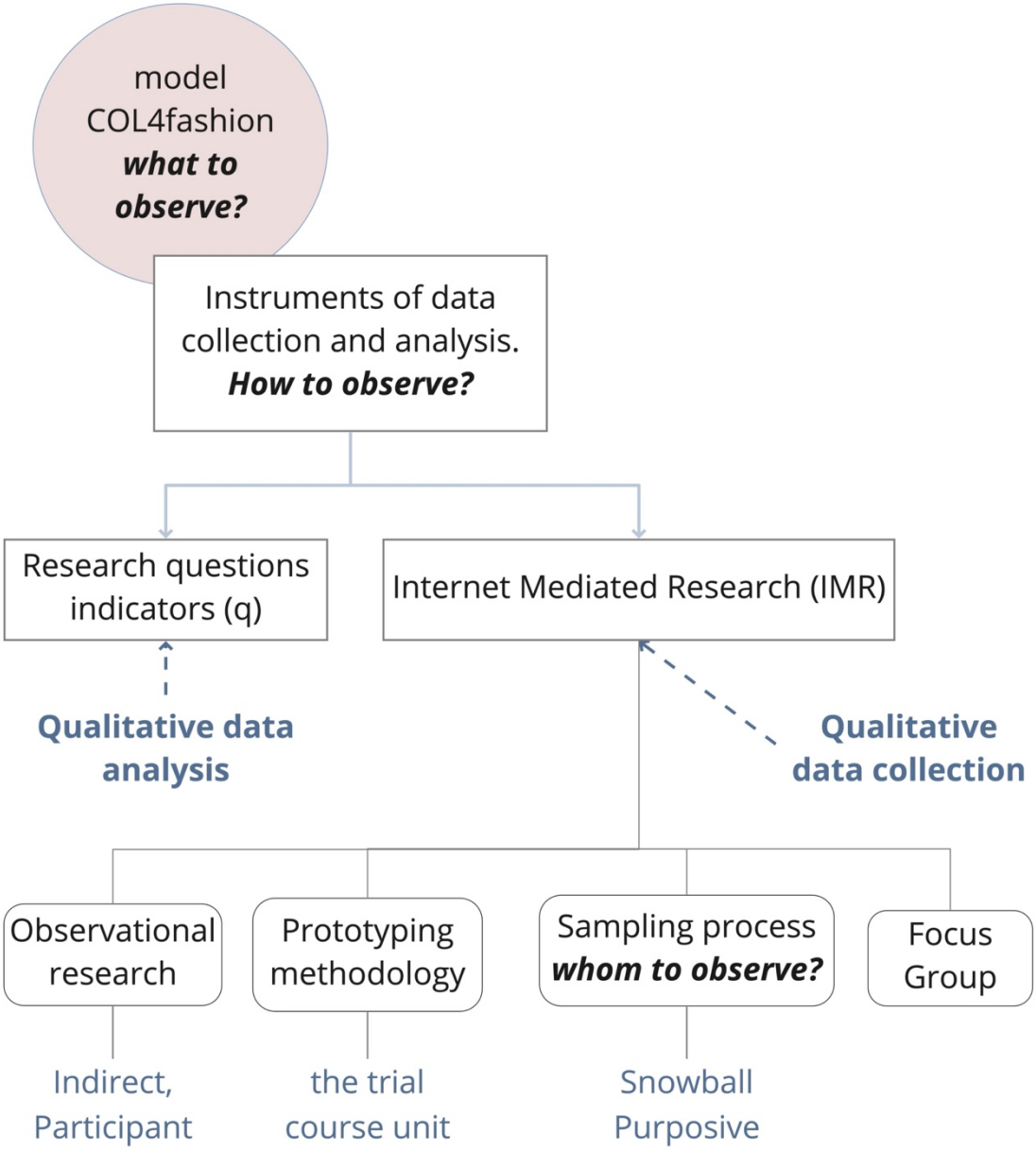


Figure 8 - Qualitative data collection and analysis

The goal of the research was to test the theoretical model, collaborative online learning for fashion design (COL4FASHION), verifying it under real circumstances, to understand if it responded to the research questions. Therefore, to generate and analyse empirical data, it was necessary to apply the theoretical model in an observable setting, a trial course unit. The development of the course unit resorted to prototype methodology, which would provide in-depth qualitative and quantitative information about the components of the model COL4FASHION, analysing it in context.

Adopt the prototype methodology for data collection was coherent, since it permitted examining the theoretical assumptions through empirical evidence, answering to the research questions, and verifying

the principles of the model, while observing participants interactions with the learning environment. Furthermore, the prototype approach accommodated new or unexpected insights about the model COL4FASHION that might surface while observing participant's engagement with the trial course unit.

By implementing a trial course unit, it required participants' involvement and commitment. So, the research adopted the snowball and purposive sampling method, to select people interested in participating in the research. This helped to select people's profile considering their expertise in fashion, as professionals or students. It was important that participants were knowledgeable about the fashion sector, market, and education, bringing their previous experiences and providing valid information about the trial course unit, and thus about the model COL4FASHION. Furthermore, this test would require a level of confidence and comfort between the participants and the researcher, to create a learning community willing to share opinions and ideas, to commit for a certain period, and to provide certain hours of interaction with the trial course unit.

Considering the trial course unit under the perspective of the prototyping methodology, the next step was to ponder how to structure it so that it would generate evidence to confront with the research questions. That evidence would not be visible to participants. From their perspective, they would participate in a course unit with normal content, activities, and assessment elements.

- How to organise the trial course unit to capture participants' perception about the model COL4FASHION without asking them directly?
- How could the trial course unit make participant's experience the model?
- How would participants indirectly respond to the research questions, as they engage with the learning environment, without disrupting their learning path?
- How to guide participants to register the information required for the research, their learning process, their impressions, and opinions as they move through the trial course unit?
- How to ensure their commitment and confidentiality throughout the research?

To respond to these questions, a user-centred approach helped identify the points of touch participants would have with the trial course unit and how to mark these against relevant information for the research. The written scenario technique (Van Boeijen et al., 2013) helped reflect on the participants' interactions with the trial course unit, and where to embed the instruments of data collection without creating disruption in their learning path. It was also important to define how to observe the interactions between the learners and the trial course unit, since it entailed different components and subcomponents of the model COL4FASHION. Observational research was the appropriate method to guide the process of observation of a real, online situation. Supported by the Internet Mediated Research

(IMR), and by the prototyping methodology, the observational research helped define the learning components and subcomponents, "marking them" as observable elements of the research prototype.
Once finished the trial course unit, it was important to know and to confirm the opinions of the participants. So, the focus group seemed the viable instrument to collect participants' perceptions about different aspects of the learning experience in a different online setting, where they could discuss freely and even bring new insights for the trial course unit and the model COL4FASHION.

4.2.1.1 Sampling, method of selection of the participants

A heterogeneous sample group, formed by professionals, students and people associated (directly or indirectly) to the fashion design sector joined the trial course unit, as learners, for a defined period (approximately two months) to document and share their opinions about the learning experience, while interacting with the learning components and with each other, exploring together the content, developing projects, and producing outcomes. The selection criteria considered the participant's profile required to meet the goals of the investigation, since they need to have experience and expertise in the fashion education and market sectors. However, other factors, such as time constraints of the research or the researcher resources, were also decisive in choosing the appropriate sampling process.
First, it was important to acknowledge that fashion design professionals and students were not easily reachable or identifiable by secondary sources of information, such as sectorial associations or official documents, even less through statistical information. To approach professional organisations scattered worldwide would be inefficient, highly costly, and time-consuming. The professional organisations would need to be identified, per world region, and selected, separate the ones focused on fashion design and confirm their status (active or not). After initial contact for further approval to approach the members, fashion designers would have to be contacted individually, build a trust relationship that would eventually lead them to join the trial course unit. Even then, there was no guarantee that they would compromise with the research. Similar issues would surface if applying this sampling process to select fashion design students from the higher education institutions.
Still, two random sampling attempts tried capture 'fashion people' interested in participating in the trial course unit. The first used Survey Circle, and the *Q1_application questionnaire*, and the second contacted sixty-two (62) fashion design associations and universities by email (in 22/10/2020, 28/12/2020 and 10/02/2021), sending a 'personalised' invitation despite the risk of getting "spammed". Two professionals responded to this invitation and joined Thinkific platform, although they never engaged with the content. The other attempt, used LinkedIn groups, trying to minimize the bias

of snowball sampling and increase the validity of the final sample. The identification and selection of groups and group members followed five criteria of selection and from the eight groups contacted, only one participant joined the trial course unit (Elle). This proved that the sampling approach, through a random sampling of impersonal contacts, was not efficient nor adequate to this research.

Other aspects considered when defining the sampling method was the maximum number of participants required to test the trial course unit, to permit the use of open and cost-free platforms and tools, the need for confidentiality for ongoing research, which would require participants to sign a Confidentiality Agreement and issuing the certificate of participation, as a final gratitude for collaboration in the research.

Therefore, the non-probability methods of sampling, purposive sampling and snowball sampling were suitable for this in-depth qualitative research (Creswell & Creswell, 2017; Smal & Lavelle, 2011) because participants would have similar knowledge about the fashion design area and about fashion design education, characteristics relevant to the topic under study. The adequate sample size to test the course unit would be between eight and twelve participants, enough to build trust and collaboration. Snowball sampling (or chain referral sampling process), in which one individual name the next could achieve cooperation and higher response rates since it selected individuals among personal networks (Baltar & Brunet, 2012, p. 1). However, choosing purposive and snowball sampling implied that the final sample would be defined by the first individuals contacted and by the ones that agreed to cooperate, either joining the trial course unit or referring someone else. This choice would influence the results of the test of the model COL4FASHION, the trial course unit and the research since it was not possible a theoretical saturation or generalisation to represent the opinion of the population of fashion design professionals and students (sampling for proportionality). The primary concern of the research was to form homogenous groups with participants with a high level of engagement and responsibility that would compromise with the goals of the research and provide valid context-based information while testing the trial course unit. Besides that, in the fashion sector, professionals are constantly "on the move", researching, developing, or producing the next fashion collections. They are not a population "geographically located", but digitally connected, resorting to social media networks to research and stay updated with what is happening in fashion worldwide. During the Covid-19 pandemic (between June and October 2020), the social media and quick messaging platforms (Facebook, LinkedIn, Instagram, WhatsApp, Tik-Tok and YouTube) became the main channel to promote fashion brands and sell fashion collections. It was then imperative to use these platforms to reach out not only fashion professionals but also higher education teachers and students of fashion design. When studying the

advantages and limitations of virtual snowball sampling methods in social media, Baltar and Brunet (2012); Kosinski et al. (2015) considered that using Facebook as a personalised strategy, for instance, helped elevate the confidence between the researcher and the respondent, since both needed to display their personal information (Facebook's profile), augmenting the response rates and the interests of the individuals. Resorting to social networking platforms (Unkelos-Shpigel et al., 2015) seemed coherent with the qualitative data collection approach adopted by the research.

The sampling protocol (Appendix D, Figure D1) guided the selection of the participants, outlining the phases of the sampling process, with time frames, and documentation, such as the questionnaires and forms. The protocol comprised three phases, containing previously defined information and associated documents. The main tool used in the sampling protocol was the online questionnaires (Google forms), to overcome the restrictions from the Covid-19 pandemic context, and to allow the contacts (direct or secondary) to share the link to new contacts, increasing the probabilities of new participants to join the trial course unit. Furthermore, the questionnaires, embedded in the Facebook and LinkedIn groups, shared, and obtained new respondents, facilitating the control and management of the responses (i.e., double answers), and activating the next phase of the protocol, diminishing the time spent on the sampling process. The sampling process ran from July to December 2020 (Appendix D, Figure D2) identifying fashion design professionals and students through Facebook 'friends' and 'groups', and through WhatsApp contacts, using the purposive and snowball sampling techniques. These were direct contacts, easily reachable, and some of them had already responded to the exploratory questionnaires and poll. From these contacts, eighteen (18) were selected since they fit the profile (Appendix D, Figure D3): fifteen were fashion professionals and three fashion students. Identified as 'guests', they received the FDOC_guest form, following phase 1 of the sampling protocol. From the direct contacts, three agreed to participate in the course unit and joined the LinkedIn group as 'trusted guests', phase 2 of the sampling protocol. Other three new contacts surfaced, and they followed phase 1 and 2 of the sampling protocol. The purposive approach sampling resorted again to personal contacts to promote the trial course unit during an online webinar about fashion marketing, conducted by a fellow teacher. At the end of the webinar, it was possible to present a brief description of the research project and invite students to join the trial course unit. From the final sample, nine participants finished the trial course unit successfully. Their identities were kept anonymous (Hewson & Buchanan, 2013; Lee & Hollister, 2020; Padayachee, 2016), using aliases instead (Figure 9).

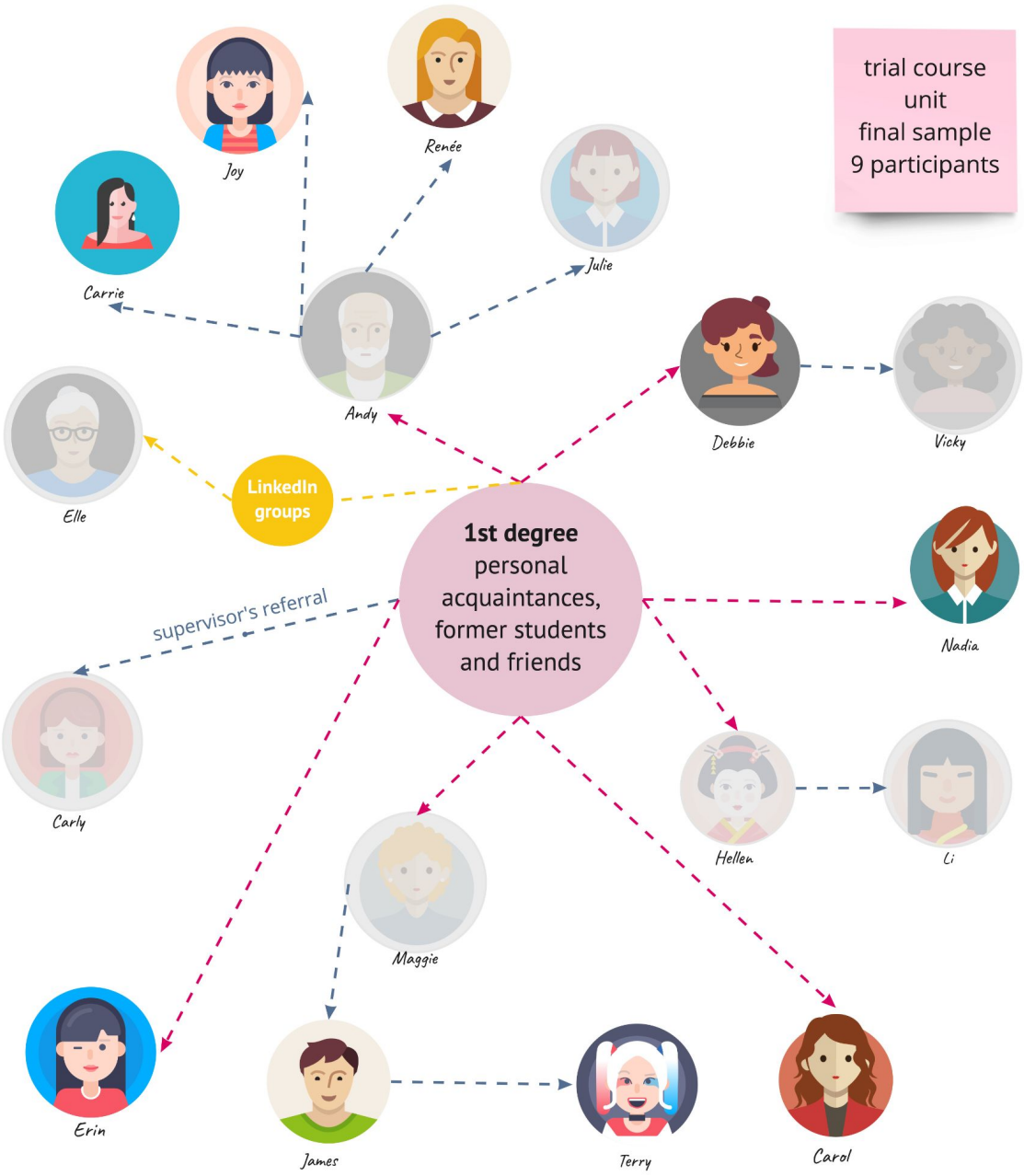


Figure 9 – the trial course unit participant's aliases.

4.2.1.2 Qualitative methods of data collection

While the Internet Mediated Research (IMR) was a required methodological approach since the initial stages of the research design decisions, it became essential during the period of data collection, from July 2020 and January 2021, because of the social distancing restrictions imposed during Covid-19 pandemic. As previously explained, IMR refers to primary or secondary research methods of data collection that resort to the internet as a medium. Hewson (2008); Hewson and Buchanan (2013, p.

22); Padayachee (2016) considered that while IMR facilitates the access to potential research participants, saves time and costs, presents high levels of interactivity, and allows immediate storage of the information, it does not resolve the low response rates or control by the researcher. Lee and Hollister (2020, p. 236) discussed retention in IMR and presented some solutions, like web conferencing technologies or incentives, which might enhance engagement, interaction and trust between the researcher and participants and ensure their continuity in the research. Hewson (2008); Padayachee (2016) also presented studies that identified difficulties of IMR regarding different levels of technological skills needed to interact with the online environment and "the idiosyncratic nature of the online communication medium" (Hewson, 2008, p. 11) like the lack of extra-linguistic cues, level of rapport, ambiguities, and a lack of depth. In fact, technical issues, such as local internet instability or unfamiliarity with software or digital tools (Lee & Hollister, 2020) and the lack of instant communication (text-messaging), presented obstacles for some participants during the trial course unit. Another weakness of the IMR approach was the influence of the (online) environment and the researcher presence in the responses of the participants, defined as:

> "reactive methods in which the researcher sets up a research situation with the explicit intent of gathering primary research data, and where participants are recruited and take part in the full knowledge that they are participating in a research study" (Hewson, 2008, p. 4).

Still, this research decided to welcome participants' awareness since it could contribute to their higher involvement and commitment to the research project. By choosing to disclose the true nature of the research, it was possible to incite the interest of professionals and experts, willing to take part, discuss and learn more about relevant issues in the fashion sector, education included. Even though participants were aware that they were contributing to a research project, they did not know the learning model, the research goals, or the research questions, which Hewson (2008, p. 5) affirmed could influence participant's responses. These methodological limitations, produced a list of problems that might surface during the data collection, helping to devise alternative solutions to be implemented, minimising their impact in the collection and analysis of results (Appendix E, Table E2).

After methodological analysing advantages and disadvantages presented by the literature, this research resorted to a participative approach to primary internet mediated research, (IMR) since it was useful with small, specialist populations, obtain original data, analyse them, and respond to specific research questions. In this context, the trial course unit would collect mainly qualitative data, both nonreactive, from the participants' interaction with the online learning environment and reactive, obtained with online questionnaires, quizzes and polls, group, and individual meetings, focused group interviews, and indirect

and participant observation (Table 4). Therefore, the qualitative approach combined Prototyping methodology, Observational Research and Focus Groups methods, supported by primary IMR to guide the data collection process and further analysis of the information obtained during the learning experience in the course unit.

Table 4 Methods and Instruments of qualitative data collection

Prototyping methodology	The trial course unit, as a research prototype.	Internet mediated research (IMR)
Observational Research	Indirect observation of the assignments completions and questionnaires responded. Evidence of asynchronous communication (comments in forums or chats, emails). Participant observation (synchronous meetings and live presentation).	
Focus Group	Interview with the participants after the ending of the trial course unit.	

4.2.1.2.1 Prototyping methodology

The implementation and simulation processes of the trial course unit resorted to the phases of the basic design cycle (Van Boeijen et al., 2013): analysis, synthesis, simulation evaluation, and decision. Under this perspective, it recognised that a prototype would allow the collection of qualitative information in a practical context. But product prototyping evaluates the usability of previously defined requirements after the simulation. These requirements were important to identify what was relevant to obtain from the trial course unit, define how functional it should be to test the principles of the model COL4FASHION. But they were not the core of the testing. The trial course unit was not a product/service prototype, but a research prototype, theory-driven prototype, as presented in Koskinen and Frens (2017):

> "The purpose of research prototypes is to articulate and test concepts that respond to questions from theoretical literature at the bottom or a research program rather than product development. Because of the connection to theory, research prototypes are tested in the light of this theory rather than in the light of things on the marketplace, manufacturability, or product safety, as in the case of industrial and design prototypes. In research prototyping, the vehicle that helps researchers to select a reduced number of variables for their study is theoretical work" (Koskinen & Frens, 2017, p. 7).

The goal of the trial course unit was to test the model COL4FASHION through simulation, imitating the properties of a real online learning scenario, with invited participants. As a research prototype, the trial course unit was the outcome of the theoretical investigation, not the end-product that solved a design

problem (Odom et al., 2016; Winkler et al., 2013). It was the "research vehicle" that needed to be tested with participants to lead the study back to the theoretical framework. The model COL4FASHION, the research questions and the principles from the theoretical framework supported the research prototype, which was expected to confirm them. An observation script guided the collection of the data during simulation of the trial course unit (observation period) and helped identify the relevant information to verify the research questions and to structure the trial course unit so it could collect the information needed (Campenhoudt et al., 1995).

Typically, in the simulation of a prototype of a product or service, the evaluation of the results informs if the requirements were met or not. However, the trial course unit, under the research prototyping approach, aimed to draw conclusions, not find solutions. The intent was not evaluating the features of the trial course unit or compare them with other online courses, nor suggest an improved version. There was not a design problem to resolve, but research questions to respond, to verify, new knowledge to explore and a research field to contribute to. So, after the simulation, it was possible to confront the results analysed with the research questions, in the light of the theoretical framework, verifying the model COL4FASHION and its learning principles.

Outlining the research prototype

This section, organised in two parts, presents the rationale for implementing the trial course unit. The first implements the specifications for the trial course unit (Appendix E, Table E3) considering the requirements of the components and subcomponents of the model COL4FASHION. These requirements and characteristics would make the model COL4FASHION testable by users/learners. The second part overviews the five parts of the trial course unit. Its full implementation is presented and discussed in Chapter 5.

The time frame of the trial course unit was the main constraint since it should respect the time available for the doctoral research. The choice for the appropriate online learning platform (o-LE subcomponent) was also a challenging requirement since it depended on the authorisation of third parties. From the start, the trial course unit needed an existing platform that could offer the technical support to implement it. So, the initial choice was to present a proposal for the University of Minho Distance Education, following their guidelines. However, the procedure to approve and implement the trial course unit did not fit with the schedule of the research project. Furthermore, in accordance with the norms of the Distance Education department, the trial course unit would charge a fee from participants, which was not the goal of the research. So, Google Classroom was the next available alternative and ultimately

served as a pre-trial for the research prototype. Finally, on August 4th, 2020, an agreement with the company where the researcher worked at, allowed the implementation of the trial course using open-source platform Moodle LMS free of costs[61]. In September 2020 the trial course unit opened in Thinkific, a similar platform for online course creation and promotion, providing a free account with full control of the online environment. Both platforms, Moodle and Thinkific stored participants' interactions in the forums or discussion tabs, as well as the completion of the assignments and logins history.

Similarly, it was necessary to select technology-based tools (o-LE) that would promote collaborative learning experience (c-LE). A set of criteria defined the technology-based tools used by the learners (in the assignment completion) and by the researcher (collecting and storing data). The criteria considered previous personal experience with the tool, its affordability (free or offer freemium options), the easiness to set up, without requiring higher technical know-how, the integration with the platforms chosen (Moodle and Thinkific), present a user-friendly interface, for mobile and desktop versions (e.g., Mac, Windows, iOS, Android, Web) and facilitate distant group work to permit sharing ideas, co-creation, experimentation, and virtual interactions.

The data collection relied on human resources, the researcher/personalised learning manager (PLM), and technical resources available in the online learning environments. The researcher's responsibility was the development of the trial course unit and its implementation in the online environments, its promotion (through videos and digital flyers) in the social media channels, the sampling process, and to collect and analyse the information from the trial course unit. It was also under the researcher's responsibility the enrolment of the participants, welcoming them and making sure they signed the Confidentiality Agreement, and responded to the questionnaires and quizzes. The PLM followed participants' progress in the course, clarified doubts, organised group and individual meetings, promoted discussions, provided resources and materials, supported the development of the projects, prepared the live presentations, supervised the deliveries, and prepared the certificate of participation. Other people indirectly involved in implementing the trial course unit were the university supervisor and the company manager. The university supervisor approved the agreement between the educational institutions and issued the certificate of participation. The company manager helped with participants' enrolment in LMS Moodle and with technical issues that surfaced during the simulation.

[61] As per suggestion of the company manager, the content development used software Rise 360°.

The documents elaborated for the trial course unit supported the information collection during the observation period and followed the heutagogical examples studied, as well as British benchmarks for the Art and Design courses. Under these guidelines (QAA, 2008), the trial course unit characterised a block unit. Still, as a research prototype, the trial course unit respected primarily the model COL4FASHION and its principles (FDLP)[62], which defined its fundaments and reflected the theoretical framework.

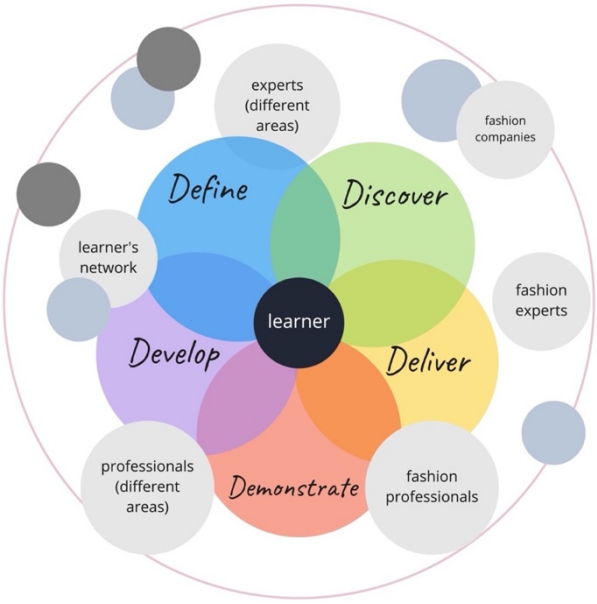


Figure 10 - The five parts of the fashion design online course (FDOC)

Different instructional design perspectives, studied and complemented by Heutagogy and the basic design cycle helped shape the course instructional model (COL4FASHION), reinforcing a user-centred perspective. The design of the trial course unit adopted a project-based learning approach, based on the Double Diamond process. The trial course unit encompassed the phases of the fashion project development, that precede the design of a fashion collection.

The trial course unit five parts: Discover, Define, Develop, Demonstrate, and Deliver (Figure 10), worked individually, influenced by all the other parts, like a system. The five parts associated with the learning components of the model COL4FASHION (Appendix A, Table A1), facilitated the activation of the fashion design learning principles (FDLP). Using the denomination of the five parts from the Double Diamond design process was also strategic to communicate clearly with the participants, concealing the

[62] Reflective Thinking, Research & Interpretation, Creativity & Imagination, Collaboration & Communication, Complexity and Uncertainty.

theoretical denomination used to build the learning components and subcomponents of the model COL4FASHION. Finally, adopting the five parts made it easier to define the observation procedure, and allocate the coherent tools and activities.

4.2.1.2.2 Observational Research

This section focuses on the observation period of the research prototype (trial course unit) and presents the qualitative approaches and instruments used, specifically for data collection in an online environment (Nørskov & Rask, 2011). The observation considered the principles of the model COL4FASHION as well as the requirements and characteristics of the trial course unit, as a research prototype. A reflection on the goals of the observation (Campenhoudt et al., 1995) allowed the identification of the relevant information and the adequate way to collect it. Although greater emphasis was on qualitative data, quantitative information on participants' interactions with the platform supported the observation: when they joined, the frequency of the logins, what they consulted and the engagement with the different assignments, the comments left in the forums or discussion areas. This information was available on the online platforms. However, the interest was to interpret the information generated by participants while completing the assignments, responding to the questionnaires and quizzes. For instance, it was important to know that participants logged in during the first week, but more important was to know what they produced, the assignments completed, if they shared it in the forums and if they received feedback from it. They would provide evidence whether the learning components of the model COL4FASHION fulfilled the expected functions, observing if participants recognised the research questions while completing the assignments. Table 5 presents the information defined as important to collect during the observation period, the techniques of collection and how they provided information about the model COL4FASHION.

Table 5 Plan for data collection during the trial course unit

Type of information	Relevance for the learning model	How to collect?
participants production	assignments completed; tools used	shared links or delivered by email or in a submission area (forums and discussion tabs)
participants opinions	relevance of the assignments, the learning model, the five parts of the FDOC.	questionnaires and quizzes; synchronous meetings; self-reflection tasks
participants interactions	comments, doubts, ideas, resources, motivations, frustrations.	asynchronously in forums and discussion tabs; during synchronous meetings

A multiplicity of information was collected during the observation period, and this meant to implement different ways of gathering the data (Hewson, 2008, 2014; Hewson & Buchanan, 2013; Lee & Hollister, 2020; Nørskov & Rask, 2011; Padayachee, 2016). Indirect and participant observation provided the instruments embedded on the platforms and collect the information while participants engaged with the learning environment. Instruments of indirect observation, like questionnaires and quizzes, allowed participants to fill them out, and collect their opinions, without the interference of the researcher (Campenhoudt et al., 1995, p. 188). This approach was important to collect participants' production, through the observation of visual and written documents like mood boards, graphics, drawing, photographs, descriptions of ideas and concepts, project outputs (intermediate and finals). Besides that, evidence of participants' interactions with the content, the community, and the learning environment through asynchronous tools, such as forums or discussion tabs, assignment completion data, collected by indirect observation, applied the quantitative and qualitative techniques (i.e., collecting data about the logins and analysing the activities completed). Still, the interactions among participants and between them with the learning components required greater involvement of the researcher (acting as PLM), to observe data while generating it. Participant observation (or non-systematic observation) is a methodological approach adopted in anthropological studies, in which the researcher joins the same group s/he studies. In the trial course unit, as a research prototype, the role of the PLM mixed with the role of the researcher, and while the first engaged with the learners the later collected data from the participants. Relying on the data collection only in the indirect observation approach would change the goal of studying the collaborative, personalised, flexible features of the model (COL4FASHION).

Furthermore, it was necessary to build trust with participants, so they felt comfortable and safe in sharing their works, ideas, and completing the trial course unit. So, the participant observation approach, adopted to observe the behaviour of the participants and collect their opinions during live meetings, allowed the researcher/PLM to guide the conversation but also react or adapt the focus of the conversation following the relevant topics presented by the participants and equally important for the research goals.

Once defined the observational approaches to be implemented during the observation period of the trial course unit, the next step was to structure the observation procedure, since it was necessary to observe and collect different variables, at different moments, to build a valid body of evidence. This seemed adequate to test the theoretical model (COL4FASHION) by putting it into practice and drawing conclusions. So, a plan, devised before the data collection started, based on the research questions, and sought to make them 'observable', through the research prototype. This was the goal of the research project and the main goal of the observation period. But, although the research questions guided the data collected, processed and analysed (observation script), this did not characterise a systematic observation approach (Anguera et al., 2018; Nørskov & Rask, 2011). While studying the research prototype and making participants feel in a real online course, unpredicted evidence could surface, which would inform the model COL4FASHION and its principles. So, the observation of the trial course unit, led by the lens of the research questions (structured by the observation script), left space to recognise informal or unexpected evidence.

Observation script and the research questions indicators

The observation script defined, in advance, parameters for the observation and data collection, based on the research questions formulated at the beginning of the research (Campenhoudt et al., 1995). It acted as a roadmap and helped to reflect on the set of operations necessary to collect 'observable' information during the trial course unit, that would be pertinent to evaluate the model COL4FASHION, its principles and ultimately the theoretical framework. It also helped to identify if the method of observation (indirect or participant) was coherent for the different instruments of data collection. Although there was an initial plan, and scenarios of use that helped to identify points of touch between the learners and the trial course unit, the observation script contributed to structure what and when to observe, and how to embed the instruments of data collection in the five parts of the trial course.

This helped to combine the type of activities (assignments) with the indicators of the research questions, making them observable throughout the course unit. Furthermore, some evidence was not directly

observable, and different instruments needed to be implemented to collect different data to form a solid body of evidence. For instance, apart from the individual or group meetings, participants engaged with the trial course asynchronously, leaving behind evidence of their participation, in form of assignments completed and questionnaires and quizzes responded. The observation script helped to prepare the trial course unit as a research prototype with adequate instruments to collect and analyse evidence from distant interactions between the participants and the researcher and among the learners.

As previously discussed, the research hypothesised (Chigbu, 2019) the model COL4FASHION as a valid option for online education in fashion design, since it promoted: Collaborative Learning (RQ1), Prospective Learning (RQ2) and Personalised Learning (RQ3).

The trial course unit, as a research prototype, would trigger the research questions, thus activating the learning principles (FDLP), which guided the development of the model COL4FASHION in the first place. So, the research questions established the connection between the theoretical and practical dimensions of the research. Table E4 (Appendix E) related the fashion design learning principles (FDLP) and the research questions (RQ1, RQ2 and RQ3) expected to activate them. While designing the trial course unit, the expectation was that participants triggered the research question, through evidence surfaced from the activities and outputs of the learning experience. That evidence could trigger one or all research questions. For instance, evidence of double-loop learning (a heutagogy principle), prompting a change in the learner's mindset, could surface from individual projects or result from interactions with the learning community. So, in each part of the trial course unit the assignments generated evidence that triggered the research questions, and thus activated different FDLP. The next step was to break down the research questions (RQ1, RQ2, RQ3), into nine indicators (Appendix E, Table E4) for the observation, collection, and analysis of the data. The indicators, grouped into categories pertaining to the same research question, worked as codes that carried the concepts and principles of analytic interest that would make the research questions observable. Triggered by the instruments of data collection, the indicators would relate back to those same RQ (Campenhoudt et al., 1995, p. 166). Research questions indicators, tagged with a coded label, were not recognised by the participants, but in the analysis of the results by the researcher. Although indicators presented a structure and provided a direction for collecting (and analysing) the data, they were broad enough to allow a flexibility in the information collection and recording (Nørskov & Rask, 2011).

Finally, the indicators would help verify the efficacy of the model COL4FASHION, highlighting its strengths and weaknesses, and even providing insights for future improvements.

The ultimate step was to 'mark' the research prototype with the research questions indicators, embedding them in the activities of the five parts of the course unit. Once more, the scenarios of use (Rosson & Carroll, 2009; Van Boeijen et al., 2013) helped identify which activities should receive an indicator, thus becoming mandatory in the perspective of the learners. Whenever participants completed the activity, they were triggering the indicators and whenever participants responded to the quizzes, their responses informed if indicators were recognised.

So, the indicators were important to confirm the learning components and subcomponents of the model and to identify deviations in the activity completion. Since the same indicator could mark different activities and each activity could receive different indicators, easily noting any deviation in the responses. Finally, the indicators could help the data analysis as well, evidencing participants testing the learning environment, engaging with the learning community, participating in online meetings ~~meanings~~, completing the activities, presenting, and submitting their projects.

Instruments of indirect observation, the questionnaires, quizzes, and assignments.

The IMR literature presented a distinction between synchronous and asynchronous forms of online interaction. Hewson (2008, 2014) considered that although reducing the conversation flow, in asynchronous interactions, participants give more considered and accurate responses, to be verified by other sources. As previously explained, as a research prototype, the research questions indicators were triggered as participants completed the activities. So, although the research resorted to video conferencing as well (participant observation), indirect observation seemed coherent to collect and process the data produced from the participants' interactions with learning components and subcomponents, without contacting them directly. So, the data collection resorted to the indirect administration of two types of observation instruments, elaborated and embedded in the five parts of the trial course unit:

- Questionnaires and quizzes (Appendix F, Table F2)
- Assignments and Deliverables (Appendix F, Table F1)

In the trial course unit, these activities collected information, that were processed, and analysed later. This choice required careful construction and organization of the activities to incentivize its completion, collect relevant information, avoiding distortions or misinterpretation. In the case of the self-administered instruments, the pre-testing during the exploratory research was an important step to improve the

quizzes and questionnaire's design. Similarly, the pre-test of the assignments in the Google Classroom allowed quick feedback and changes to be implemented rapidly on the new platforms. Finally, to allow more control and guarantee that they would fulfil their function as instruments of data collection, different activities related to a different set of research questions indicators, helping a more accurate observation, collection, processing, and analysis of the data, allowing to identify and inspect distortions or inconsistencies in the answers. Still, as instruments of data collection, activities might not trigger all indicators marked, but they still informed about the coherence of the results, between participants responses, the different activities, and the researcher observations.

Characterisation of the questionnaires and quizzes (Q)

Online questionnaires and quizzes used before, during and after the trial course collected respondents' perspectives about fashion design education and participants' opinions about the activities completed in the different parts of the course unit. Albeit completed directly by the participants, questionnaires and quizzes had different analysis procedures. Questionnaires aimed to know more about the participants (*Q1_Application form* and *Self-diagnosis, D1P2.1*), their expectations about the learning components (*Question about the Group Meeting, D1P3.2*; *Question about the Individual Meeting, D1P5.4* and the *Personalised Learning Agreement, D1P6.1*) and how they evaluate their learning experience (*Self-Scoring, D7P2.3* and *Q7_course unit evaluation*). So, while questionnaires required further interpretation and contextualization from the researcher, the quizzes provided straight answers about a set of activities. Participants knew that the questionnaires and quizzes were collecting their opinion about the five parts of the trial course unit. However, they were not aware that they were providing information about the model COL4FASHION, its components and subcomponents.

During the trial course unit, the questionnaires and quizzes allowed a greater individualization of the answers, which was very important for a more contextual analysis of the results. Including different questions, allowed creating 'traps' to spot deviations in the responses, for instance, presenting opposite questions or asking the same question in two different ways, or even changing the order of the questions. Specially to complete the Personalised Learning Agreement (PLA) during the Discover part, it was important to include images or schemes that illustrated the information, making it easier to understand. The answers to the questionnaires immediately generated spreadsheets, storing the information for posterior processing and analysis. Data, presented in different ways (i.e., through graphics and tables), better illustrated the information. Some questionnaires (*Q1_application form*) used different platforms (Google Forms and WenJuan, for participants living in China), essential to minimise the period of data

collection and processing, identifying participants that did had not respond. The questionnaires and quizzes embedded in the trial course unit were essential to allow participants to respond at a convenient time, simply by accessing the link available in the lesson.

There were six (6) questionnaires (Appendix F, Table F2) and ten (10) quizzes (e.g., *Q2_question about Define*), implemented in Google Forms and embedded in the platforms at the end of each part of the course unit, as important instruments of data collection. The Discover part had six (6) questionnaires and quizzes, that collected information on three different levels. On the trial course unit level, these instruments collected information about the participant's previous experience and expectations and the applicability of the course in their professional lives. They also prepared participants for the learning experience, helping them to take responsibility for their learning path. On the level of the model COL4FASHION, they gathered information to help the negotiation of the learning components for the next parts of the course unit. At the research level, they collected information to be confronted with the research questions and research goals.

To maintain consistency throughout the trial course unit and avoid conflict while responding, the questionnaires and quizzes were at the beginning or at the end of each part of the trial course unit, maintaining a familiar learning environment. The structure of the questions followed the same typology (Appendix F, Table F2). The different typology of questions aimed to collect more accurate responses from the participants: multiple choice, grid questions (checkbox or multiple-choice grid in Google Forms), dichotomous scale (Yes and No), open questions (short answers or paragraphs in Google Forms), five-point unipolar or bipolar scale (linear scale in Google Forms).

Characterisation of the Assignments (A)

Embedded in the five parts of the trial course unit, the assignments guided participants through the stages of the project development, from the Discover to the Deliver parts (Appendix F, Table F1). Some assignments, completed directly on the online platform, used the tools suggested by the course or chosen by the participants. The learning community could share the assignments using forums or discussion tabs, and participants could provide feedback on each other's assignments. At the end of the trial course, participants submitted the deliverables: outputs and results of the projects (presented live or as a recording) and self-assessment reports. Foremost, as instruments of data collection, each assignment generated data for the research, triggering or not the indicators of the research questions.

The learning content, organised in the Define part of the trial course unit, represented the subject of interest for the participants to join the research project.

The availability and openness of the content at the beginning of the trial course unit, moved the focus from the topics to the personalised paths each learner would choose.

The trial course unit had twenty (20) assignments, distributed in the five parts (Appendix F, Table F1) that participants needed to complete to finish the course unit successfully. From these, five (5) assignments were optional since they were complementary to the research and might be coherent with some projects and not others.

The Discover part had eight (8) assignments[63] (four were optional), organised in six (6) groups. The assignments aimed to introduce participants to the course unit, the learning community and help them complete the Personalised Learning Agreement (PLA). Define part had five (5) assignments organised in two (2) groups and aimed to guide students to identify the brand and the market they would work with. The six (6) assignments in the Develop part helped participants to develop their fashion projects, following the negotiation of the Personalised Learning Agreement (PLA). In the Demonstrate part, participants needed to share their work with the learning community and, from the feedback received, improve the final projects before the final delivery. It had one (1) assignment that required participants to deliver the records of the reflective learning journal (RLJ). The Deliver part informed about the submission and presentation of the deliverables and the final project that congregated the previous assignments elaborated in the Define, Develop and Demonstrate parts. The deliverables resumed learning assessments required as per the Learning Contract and the negotiation of the PLA: oral presentation, written assignment, report, set exercise and project output.

Instruments of participant observation, the meetings (M)

As previously discussed, although a lengthy process, the participant observation (Nørskov & Rask, 2011) seemed coherent to collect information in the course unit, since the role of the personalised learning manager (PLM) and the researcher blurred. In fact, the PLM had access to information that participants would not have shared with the researcher. As PLM, it was important to know and understand participant's previous experiences and frustrations, to help them align the course goals so they could develop their project ideas and fulfil their expectations. This enhanced their motivation and engagement with the research project. While clarifying participant's doubts or guiding them through the parts of the trial course unit, the PLM informed the researcher about improvements or changes to implement in the

[63] Except the reading of the Course unit documents (D1P1.1).

lessons and the researcher advised the PLM to improve instruments of data collection or clarify information that were relevant to verify the research questions and the model COL4FASHION.

The data collection during the participant observation resorted to four (4) synchronous video conferencing meetings in Discover, Demonstrate and Deliver parts (Appendix F, Table F3). The first meetings, in the Discover part, aimed to introduce the learning platform and create trust, build a sense of community, and enhance the opportunities of collaboration in the next parts of the trial course unit. During the group meetings interactions and conversations, it was possible to identify the emergence of the research questions indicators. Individual meetings worked as in-depth unstructured interviews. The script was the PLA document filled by the participant with its negotiable learning components (NLC). Since the learning components of the PLA related with the research questions and with the model COL4FASHION, the individual conversation provided participant's opinions about them.

4.2.1.2.3 Focus group

A focus group (online group interview), implemented after the trial course unit, reunited synchronously the participants on an online platform. The goal was to confront the information collected during the trial course unit with the one collected at a group meeting (Colucci, 2007; Dawson et al., 1993; Krueger & Casey, 2002; Merton, 1987; Monolescu & Schifter, 1999). Besides that, the focus group was coherent to obtain different insights and deep opinions of the participants and identify improvements for the learning model (COL4FASHION). Therefore, the line of questioning focused on the trial course unit, following the research questions indicators. The questions, organised around five activities, had two parts (Figure 11). The purpose was to observe how they solved the activities as a group and what inputs they provided while doing it (Appendix G, Figure G1).

In the first part, Activity 1 required participants to place 'emojis' indicating how frequently the research question indicator was triggered during the learning experience.

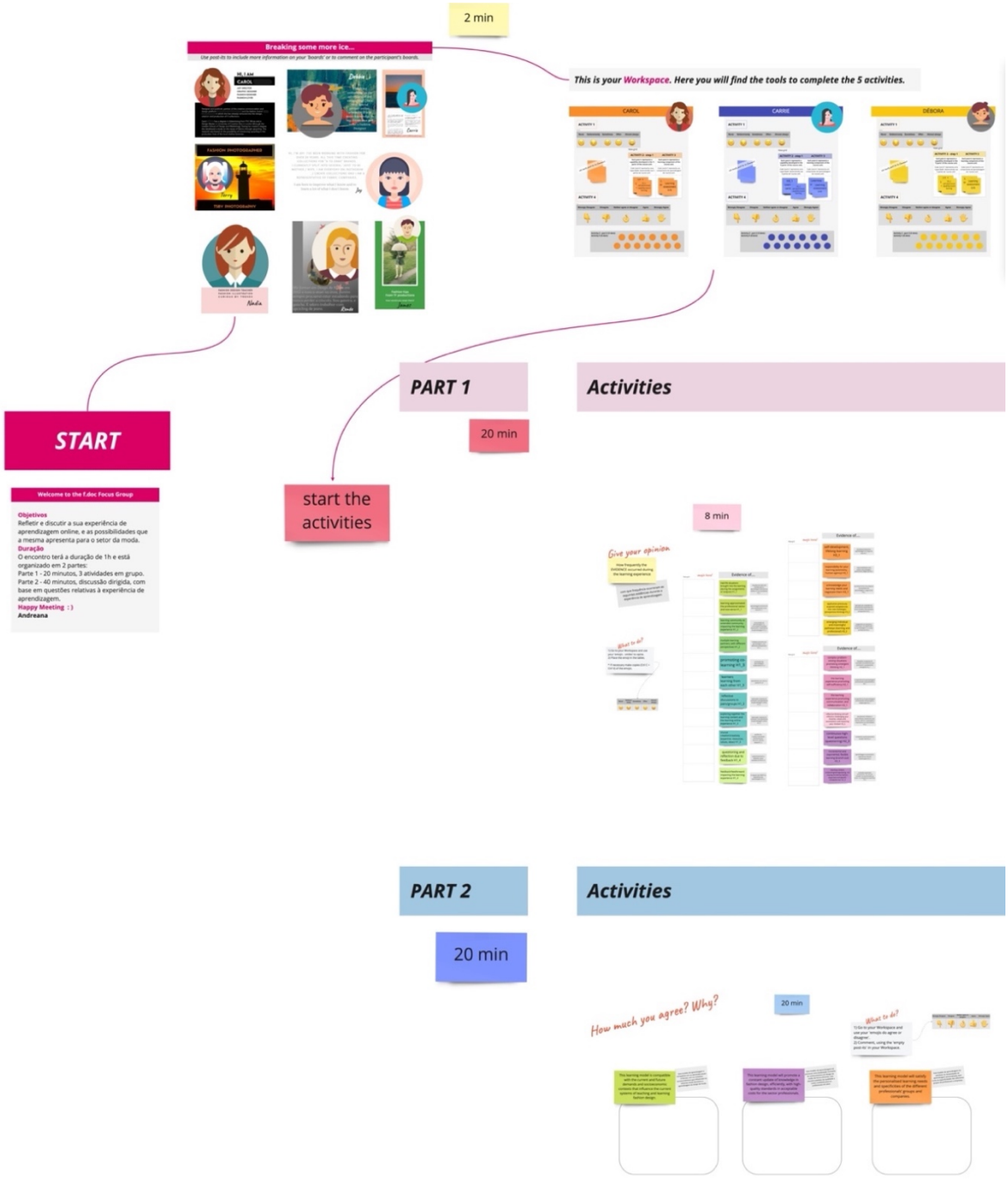


Figure 11 - Focus group activity board

Activity 2 required participants to use "post its" to place the indicators in each of the five parts of the course unit, informing which part they found more difficult. Activity 3 required participants to vote on the Learning Components they considered should improve, presenting suggestions.

The two activities (Activity 4 and Activity 5) of part 2 focused on the research questions, aiming to generate a free discussion around them. These activities represented a different way of collecting the same information participants had already provided during the trial course unit. So, they acted as a confirmation, to enhance the reliability of participant's opinions during and after the trial course unit.

Pre-defined by the Focus Group script, the activities guided the interaction among participants, letting them speak freely about the learning experience, but keeping the focus on the topics and ensuring to collect relevant information. In this sense, the option for a set of activities was then an attempt to minimize the "superficiality of online synchronous interactions, such as the focus groups, in internet mediated research" (Hewson, 2008, p. 11)

The online environment presented advantages, especially during the imposed social distance period due to the Covid-19 pandemic. With the impossibility of promoting a physical meeting, it was necessary to test the online environment and consider the technological aspects, like participant's limited internet access or the possibility of recording the meeting. Participants were physically distant but virtually together, diminishing their influence on each other and avoiding paired conversations. They felt less intimidated by expressing their opinions and perspectives about the learning experience and informed the positive aspects or the barriers (technological, language, content related) they encountered. Lee and Hollister (2020) considered that asynchronous online focus groups "can enable greater self-disclosure, increased reflexivity, and an opportunity to collect details of participant experiences over time." (Lee & Hollister, 2020, p. 326). Adopting the focus group as a method of data collection allowed to collect more information in less time, using a more flexible open-ended line of inquiry, which would promote new insights, relevant when testing a research prototype, such as the trial course unit. In fact, the focus group was a coherent choice to test the research prototype, providing ideas, exploring the 'users' opinions, confronting the research questions, and informing back to the model COL4FASHION.

Resorting to focus group methodology on the data collection phase provided greater understanding of the participant's learning paths and if the components of the model facilitated or constrained them. As a type of in-depth interview, the focus group would collect information to complement, clarify, confirm (or not) the results obtained during the indirect observation of the trial course unit, with the questionnaires and quizzes. It was possible, for instance, to confront the information collected in the focus group with the responses obtained in the *Q7_evaluation questionnaire*.

The presence of external help was another aspect considered when resorting to focus groups, especially in an online environment, since the accuracy of data collection, needed to be carried out by more than just the researcher. Therefore, two co-workers of the researcher (their aliases Sandy, specialist in user interface design and Agnes, graphic designer) took notes of the session, while the researcher moderated participant's interactions. This way, besides being aware of and resolving technical issues, the moderator could respond to participants' doubts, favouring their questions since these could trigger a conversation about or that surpassed the key topics.

One of the known disadvantages of focus groups is the small sample used, which creates biased opinions and might restrict the external validity of the results and generating context-specific data. Nevertheless, and although participants represented a purposive sample, they shared common interests, characteristics and were also specialists in the fashion sector, with different backgrounds, and for this reason presented relevant opinions and insights that fed the research prototype and the COL4FASHION model.

4.2.1.3. Procedures for the qualitative analysis of the data

Supported by the framework analysis method, this section presents the procedures used to interpret and understand the data collected by the qualitative methods (Bryman & Burgess, 1994): prototyping methodology, observational research, and focus group. The framework analysis is a type of thematic analysis method for analysing qualitative data through pattern identification and interpretation of the information collected.

While methodological triangulation enabled data collected in the exploratory research, literature review and the testing of the model COL4FASHION, the stages of the framework analysis (Familiarisation, Thematic framework, Indexing, Charting and Summarising, Mapping, and Interpretation), used together with the observation script, helped operationalise the triangulation of the data collected by different methods – method triangulation, within the methods and between the methods (Creswell & Creswell, 2017; Denzin, 2010; Hewson, 2014). Triangulation within the prototyping method, for instance, provided data through the participants' interactions with the five parts of trial course unit (research prototype). The prototyping method allowed data to be collected via Questionnaires and quizzes (Q), Assignments (A) and Meetings (M), different instruments of the observational research method (indirect and participant observation).

Data Analysis procedures

The process and analysis of the qualitative data collected during the simulation of the trial course unit (research prototype) covered four stages, based on the framework analysis approach.

Stage 1 - Thematic framework and indexing

As previously explained, the research questions and the research goals (the thematic framework), informed by the exploratory research, refined the problem, and identified relevant topics for the observation. It was possible then to build a theoretical framework with principles that supported the model, collaborative online learning for fashion design (COL4FASHION).

To test the model, through the trial course unit (research prototype), the observation script defined the procedures under the deductive coding approach, tagging nine indicators (indexing), as illustrated in the Table E4 (Appendix E). This procedure allowed to assign the research questions to the instruments of data collection (QAM) and embed them in the research prototype (trial course unit).

Although, the indicators defined, in advance, the data to be observed (deductive coding approach), the inductive coding approach helped to contextualise and interpret them as per the activity that triggered them, or comparing same indicators triggered in different activities. So, the indicators led to the research questions through different analytical paths.

The analytical matrix (Appendix H, Table H1) represented the indexing process of assigning the indicators to the qualitative data instruments (Q - questionnaires and quizzes, A - assignments and M - meetings). The QAMs and the research questions indicators received a colour code to identify them when creating the graphics, for instance, during the analysis of the results. As indicated in the analytical matrix (AM) the QAMs marked by one-hundred and fifty-eight (158) indicators, or "expected indicators", related to the learning components, and subcomponents of the model COL4FASHION. The "expected indicators" represented the evidence associated with the respective research question, triggered when participant completed an activity (A), evidence of their discourses (M) or when participants recognised the capability responding to the questionnaires and quizzes (Q). The Learning Discovery (LD) component had thirty-three (33) expected indicators, marked against one (1) questionnaire and three (3) quizzes, one (1) assignment, and two (2) meetings. The Learning Contract (LC) component had nine (9) expected indicators, four (4) triggered by a quiz, and five (5) when completing the questionnaire Personalised Learning Agreement (PLA). Finally, in the Learning Experience (LE) component, one hundred and sixteen (116) expected indicators ought to be triggered by one (1) questionnaire and four (4) quizzes, one (1) meeting, four (4) assignments.

The analytical matrix (AM) strengthened the connection between the data collection and data analysis, helping to review what was relevant to the analysis, to iterate between the research questions and the data observed and to differentiate the researcher's inferences from the participants' opinions. The analytical matrix indicated nineteen (19) mandatory activities learners need to fulfil and related them with the coherent instruments of data collection.

Stage 2 - Familiarisation

Since thematic framework and indexing had been defined at the beginning of the research, 'familiarising' was the first step of the framework analysis procedure carried out after finishing the trial course unit. The process comprised recovering and reviewing the answers from the questionnaires and quizzes (Q), evidence from the assignments (A) and transcribing the recordings from the meetings (M), arranging, or categorising them into clusters, for the analysis, following the clustering technique (Bienkowski et al., 2012).

Under the Internet Mediated Research (IMR) perspective, the initial familiarisation with the data resorted to the learning analytics approach. Learning analytics basis on data processing, technology-learning enhancement, educational data mining, and visualisation to inform the learning process decision-making (Elfeky & Elbyaly, 2021; Schneider et al., 2021; SoLAR, 2021). Although the goal of the data analysis was not improving the trial course unit, but inform the model COL4FASHION, the lifelong learning and learner-centred perspectives adopted by the learning analytics approach helped to interpret the lifecycle of the participants, as learners, from their enrolment to the conclusion of the trial course unit. For the data analysis it was relevant to summarise the interactions participants had in the forums or discussion tabs, the uploads, date and number of logins, access to the content, and the tools used (Trello, Milanote, Mural, blogs, and YouTube visualisations), but use this information to support the interpretation of the results. So, while analysing the quantitative information from the trial course unit platforms through learning analytics procedures provided a picture of the participants engagement throughout the course unit, the findings obtained from the observation method (indirect and participant) and from the focus group resorted to the framework analysis.

The responses from questionnaires and quizzes (Q) in Google Forms automatically generated different spreadsheets and graphics, and participants completed the assignments (A) using different platforms and tools during the trial course unit, generating evidence of their completion, and weekly email notifications from the platforms sent to the researcher. The quantitative information provided by the learning analytics approach facilitated the collection of these results. The analysis reviewed the results

from both instruments (Q and A) and the correctness of the answers confirmed, eliminating the invalid ones, separating the open/closed questions and submission areas, compiling, and organising the assignments completed by participants, identifying who completed them or not and which digital tools they used. Quizzes and questionnaires had separated analysis procedures. The questions in quizzes related directly to the indicators and aimed to confirm the information provided by the participants in the other instruments. The answers from the questionnaires needed to be reorganised into new spreadsheets, generating graphics that illustrated the responses related to the indicators, making the information clearer for further analysis. Similarly, questionnaires *Q1_application* and *Q7_evaluation* had a separated analysis, since they aimed to uncover participant's opinions about fashion design education or confirm the results obtained from the QAMs during the trial course unit. The final step was to include the transcriptions of the group and individual meetings (M) in the framework analysis. Following the same procedure used for the QAs, the indicators of the research questions "marked" the transcriptions of the meetings (M) and worked as themes of the coding process that identified and later analysed in the discourses or opinions of the participants.

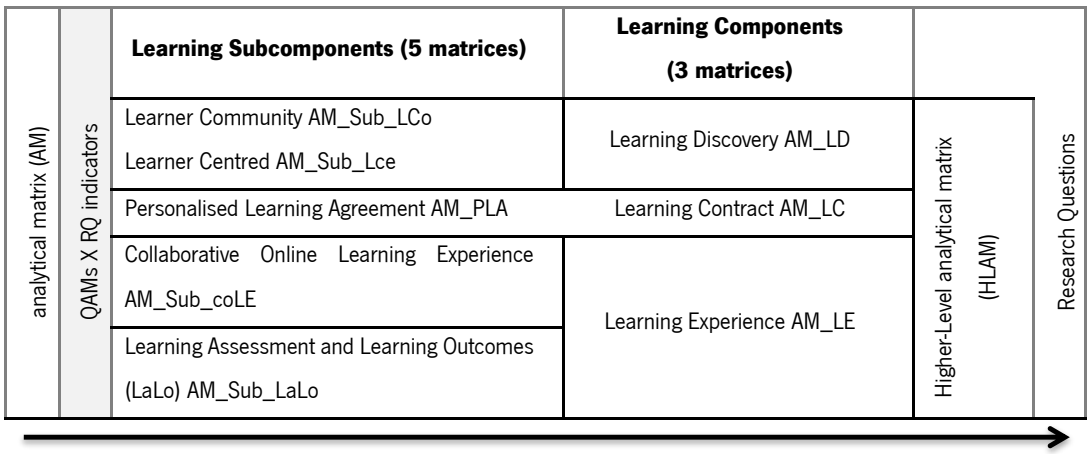
Stage 3 - Charting

The results from the QAMs were included in the analytical matrix (AM) and indicated if each QAM triggered or not the "expected indicators", thus activating (or not) the research questions in each learning component and subcomponent of the model. However, to place the results of the QAMs into the analytical matrix (AM), they needed further processing and rearrangement. First, the results from the questionnaires, quizzes and assignments needed to inform if the expected indicators were "MET" or "not MET" or yet, if they triggered "unexpected indicators". It was necessary to build a set of parameters (Appendix H, Table H2) defining what to consider as "MET", "not MET" or "partially MET". Similar labels, applied for the assignments, designated "completed", triggering the expected indicators, "partially completed", or "not completed", representing that it did not fully achieve the "expected indicators". Although participants could negotiate the assignments, adapting and developing them coherently to their personal or professional needs, this would not invalidate the goals of the assignments, or the expected indicators associated with them. These labels did not apply for the meetings (M) that followed the framework analysis "charting" process, to examine the contents from the transcripts.

The activities of the focus group, organised in accordance with the observation script, used the research questions indicators as well. This allowed the detection of possible deviations and confirmation of the information collected with the QAM during the trial course unit. With the parameters defined, the charting

procedure (Table 6) started by looking at the smallest units, the QAMs. The process identified if QAMs triggered the expected research questions indicators. This generated five (5) submatrices, combining results from QAMs in the subcomponents and three (3) matrices (Table 6) that combined the results from the subcomponents. Results from the matrices of the learning components combined in a Higher-level analytical matrix (HLAM), constitute the mapping stage of the analysis.

Table 6 Charting procedure



The procedure:

- Identify if the expected indicators were "MET" by the QAMs, within each learning subcomponent, in accordance with the parameters defined (Appendix H, Table H2). The reasoning was that if the indicators were "MET" in the subcomponents, then they would verify the RQ in the learning components (LD, LC and LE).
- Quizzes (Q2-Q6) evaluated participants' opinions in relation to each subcomponent. So, it was relevant to know if participants responses recognised, or "MET" the expected indicators. Including the results from the quizzes generated three matrices: AM_LD (Appendix J, Table J1), AM_LC (Appendix J, Table J2), and AM_LE (Appendix J, Table J3).

Stage 4 - Mapping

The analysis of the Higher-Level analytical matrix (HLAM) guided the final stage of the framework analysis method, the interpretation of the results, mapping, reflecting, and establishing relations. The procedure was to combine and compare the learning components matrices (AM_LD, AM_LC and AM_LE) with the research questions and generate the Higher-Level Matrix (HLAM). This constituted a separated section in Chapter 5, comparing the results at the HLAM with data from the questionnaire *Q7_course unit evaluation* and the Focus Group, presenting new evidence or reinforcing the previous

results and creating the basis for further discussion about the model COL4FASHION. At this stage the data had provided responses to the research questions and supported the discussion about the model COL4FASHION (in the Chapter 6), and about the fashion design learning principles (FDLP) its limitations and required improvements.

4.3 Conclusions from the research methodology

Overall, the methods and instruments used to collect and analyse the data were coherent with the research design and helped to untangle a complex process of investigation, with different obstacles to address.

The main methodological limitation concerned with the very methodological foundation since the research required to address different goals and respond to the research questions. This demanded a deeper study and understanding of the epistemological and methodological possibilities, to outline a research design that could cover all the stages the research required.

The next relevant limitation or obstacle was the time-consuming sampling process. Although thirty-eight (38) people enrolled in the two platforms (Moodle and Thinkific), only nine (9) continued with the research and finished the trial course unit. The other limitations, identified during the trial of the course unit, were the selection of the platforms, and lack of technical knowledge and skills to manage the system functionalities in Moodle, making it necessary to create, from scratch, the trial course unit to upload it in a different platform (Thinkific). Furthermore, the trial course unit, designed for an international audience, produced the content in English only. However, due to the time limitations to fulfil the research project, the final sample was formed by Portuguese speaking participants. This impacted the retention rate. Although most of them had a moderate level of English skills, to read the materials and produce texts in English demanded more time, so the language barrier was a constraint. Another barrier was the participants' lack of availability to start all at the same time, as initially planned, which impacted greater possibilities of collaboration.

Finally, the Covid-19 pandemic brought the participants together during the trial period of the course unit, making them more available to complete the course unit. But it also overloaded the researcher's professional life, working from home in two schools and in the trial of the course unit at the same time. Still, the period of the "lock downs" also presented different opportunities for the research, such as new digital tools and systems, more respect and curiosity for the online learning environments and a greater sensibility to the subject of the research.

5. Qualitative analysis of the data

This chapter describes the analysis of research data and constitutes the operationalisation of the framework analysis approach, as described in Chapter 4, namely Stages 2 Familiarisation, 3 Charting and 4 Mapping. It presents the results obtained from the data collection, during the observation period of the trial course unit (the research prototype) and it is organised in four sections: Section 5.1 explains the implementation of the trial course unit as the prototype to test the model COL4FASHION; Section 5.2 presents the sampling process that selected the participants to test it and Section 5.3 analyses the results obtained from the simulation, relating them to the components of the model COL4FASHION. Finally, section 5.4, summarises the findings and prepare them for further discussion in Chapter 6.

5.1 The fashion design online collaborative course (FDOC)

This chapter details the simulation stage of the basic design cycle (Van Boeijen et al., 2013), used to implement the fashion design online collaborative course (FDOC). It explains the characteristics and requirements (Appendix E, Table E3), that resorted to the Delft Design "Checklist for Generating Requirements " (Van Boeijen et al., 2013, Part 2 - 2.1 Checklist for Generating Requirements section) to plan the implementation of the trial course unit, not only as an instrument of data collection, but as a prototype (FDOC) that made the model COL4FASHION visible to participants. The data collection depended on the 'good' performance of the prototype, since its characteristics influence the learners' interactions with the activities. Therefore, resorting to the written scenario technique, determining scenarios of use (Van Boeijen et al., 2013), helped to identify the activities participants would engage with to then allocate the indicators of the research questions related to these activities (Appendix I, Table I1). The evaluation of the research prototype happened during the simulation period, verifying if participants generated data and if the FDOC was collecting data. The major challenge was to organise the FDOC learning environment, activities, and tools to simulate the learning experience, while at the same time collect information needed for the research.

5.1.1 Fashion design collaborative online course - why? what?

This section summarises the rationale behind the definition of the Syllabus expressed in the Learning Contract (Appendix B). The challenge was to materialise the model COL4FASHION as a course unit (FDOC),

respecting the theoretical framework and the learning principles (FDLP)[64]. Additionally, it was necessary to incorporate the indicators of the research questions within the FDOC without compromising the learner's experience. Although the FDOC did not award credits, the EHEA and UK credit value systems helped define the coherent workload (Appendix I, Table I2) for the typology of the course unit[65].

Figure 12 - FDOC trial course cover in the Thinkific platform.

5.1.2 Fashion design collaborative online course - where? when?

The promotion of the trial course unit started in July 2020, among personal acquaintances and referrals (Appendix I, Figure I4). In August 2020, the simulation of a 'low fidelity' prototype ran in Google Classroom. The feedback from "guest participants" helped develop a second simulation, with the improved prototype, starting in Moodle LMS and in the Thinkific online course platform (FDOC Thinkific). The observation period started between September and November 2020, to finish on January 31st, 2021, with the live presentation of the projects. In Moodle LMS, the duration of the FDOC was of nine (9) weeks instead of the eight (8) weeks initially defined, since participants had difficulties balancing their personal and professional commitments with the course unit.

[64] Research & Interpretation; Collaboration & Communication; Reflective Thinking; Complexity & Uncertainty; Creativity & Imagination

[65] ECTS Users' Guide 2015. European Credit Transfer and Accumulation System (ECTS) is a tool of the European Higher Education Area (EHEA)

5.1.3 Fashion design collaborative online course – to whom?

The FDOC was intended for students or professionals which, through a collaborative online learning experience (c-LE; o-LE), wanted to improve the understanding of trends, brands, markets, and fashion design collections. Therefore, the expected profiles of the FDOC learners were:

- P1. Learners who wanted to improve their understanding of trend analysis theories, concepts, and methods.
- P2. Learners aiming to enhance professional competence, translating it to the industry, to a brand, or a collection, or even to enrich their portfolio.
- P3. Learners who appreciated fashion and sought to start or continue studying the field.

The stakeholders of the FDOC combined those of the research (Figure 13). They were the participants that agreed to collaborate with the research, and that once enrolled in the FDOC, assumed the role of "learners". The personalised learning manager (PLM) and researcher, the thesis supervisor (from University of Minho) and representatives of two supporting education institutions (London School of Design and Marketing, LSDM and Instituto Brasileiro de Moda, IBModa) formed the learning community of the FDOC. All learners joined the FDOC in Moodle LMS, in November 2020, but in the Thinkific platform, learners could join in different moments and work in groups or individually, exploring the learning environment at their convenience. As learners, participants needed to follow the requirements defined by the model COL4FASHION (Chapter 3) and engage with the five parts of the FDOC - the activities, resources, tools, and materials (o-LE subcomponent) and enrich the learning content, broadening or contextualising it.

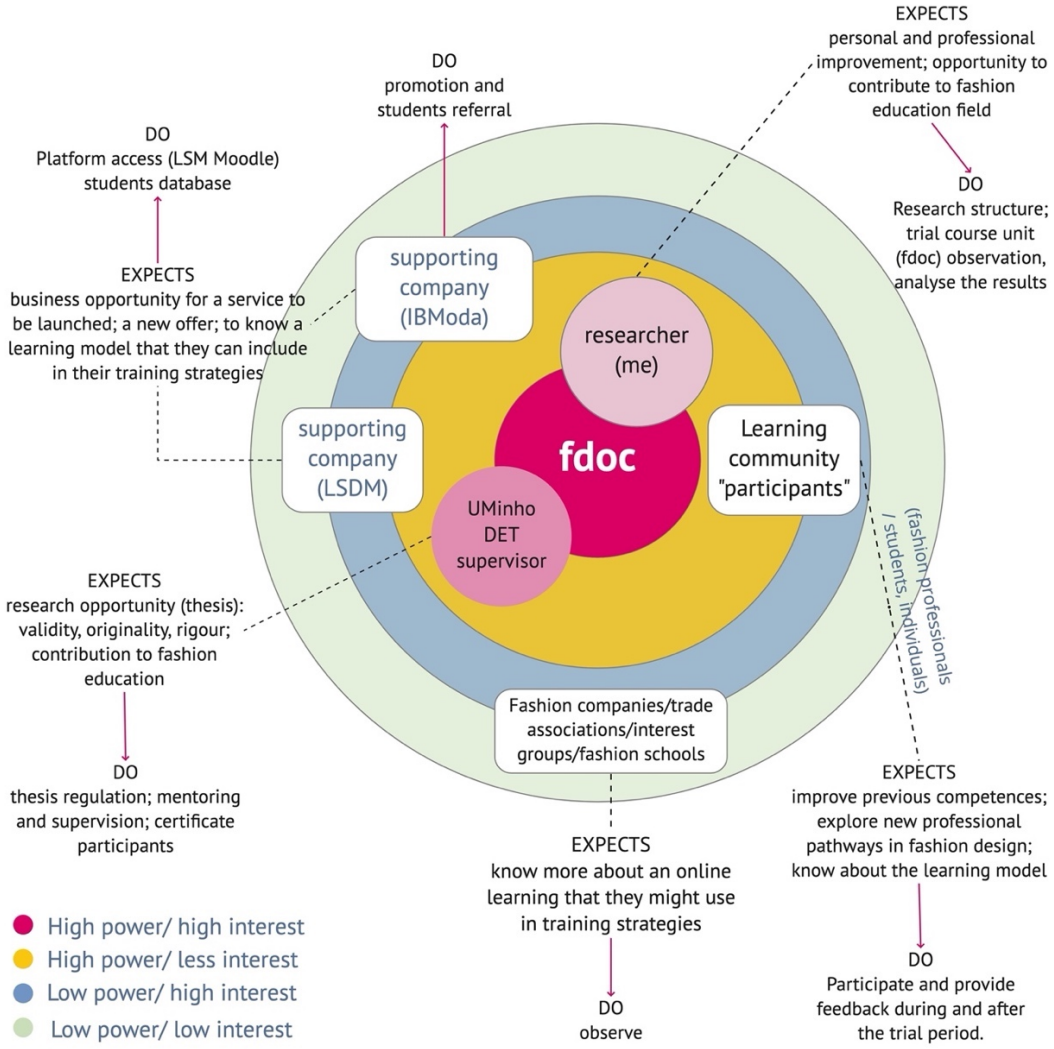


Figure 13 - FDOC stakeholder's map

5.1.4 Fashion design collaborative online course (FDOC) – how?

This trial course unit, FDOC had five parts that followed the phases of the Double Diamond design cycle (Design Council, 2019, May 17): Discover, Define, Develop, Demonstrate and Deliver. They worked in an interrelated manner and were the interface with the user. Still, as a research prototype, they functioned as instruments of data collection, relating to the components and subcomponents of the model COL4FASHION.

In the model COL4FASHION, the learning started with the Learning Discovery component (LD). So, in FDOC it started in the Discover, an introductory part where learners identified their expectations and needs, as well as the learning outcomes they wish to achieve. Learners had a learning plan "Assignments and Deliverables" (Appendix F, Table F1) and negotiated the Learning Contract (LC)

component. By completing the activities, participants were also completing the QAMs (quizzes, questionnaires, assignments, and meetings) of the research prototype. As an intermediate component, the Learning Contract (LC) supported the institutional goals and allowed learners to prepare for the Learning Experience (LE) component. The LE component related to the Define, Develop, Demonstrate and Deliver parts, as follows.

Discover

Organised in six (6) groups and in different levels (internal and external, individual, and collective), the fashion-focused QAMs of the Discover part[66] not only helped learners get familiarised with learning model and the learning community, but provoked questioning on preconceived ideas (inquiry-based learning), uncovered previous experiences and individual interests. Reflecting on the topics of interest and how to approach the outcomes, learners were more prepared to complete the Personalised Learning Agreement (PLA) and negotiate the Learning Experience (LE) component.

Define

Divided into "Define, learning content" and "Define, assignments". The learning content, organised into four (4) topics, related to fashion design collections, fashion brands, and fashion trends. While the core content followed institutional objectives, learners and the learning community could expand it, with relevant topics. The content was available from the start, thus placing more emphasis on the process of discovery, allowing learners to propose pathways more aligned with their interest. The assignments guided the discussions, and helped learners define the problem they wish to address during the LE. Projects could arise from a single project brief, from a real professional challenge, with defined constraints and desired outcomes, or brought by an external brand or company, by the learning community, or by the HEI. Learners accessed the materials and resources (o-LE), coherently with the projects and discussed with the learning community (c-LE).

[66] Examples are the assignment *D1P2.2_Breaking the ice* or the *D1P3.1_Group Meeting*, which introduced the platform and shared individual/collective motivations and expectations. On the External level, the optional assignments *D1P2.3_Fashion Network Map*, *D1P4.1_fashion circle* and *D1P4.3_Glocal Fashion* for instance, recognised that in an online open community, the extended network was also a source of knowledge, and could bring content that enhanced the pre-defined ones (learners as content creators). Learner-centred assignments such as D1P5.1_My Fashion Brief, the quiz D1P2.1_Self-diagnosis or the D7P2.1_Reflective Learning Journal and assignment D1P5.2_Future in/for Fashion helped learners to reflect on future professional paths in fashion, and their role in it, adopting a lifelong learning perspective.

Develop

This was the longest part of the course unit since learners were creating and testing initial ideas and refining their projects, exercising self-reflectiveness (Blaschke, 2012; Bolton, 2010; Canning & Callan, 2010; Hibbert, 2013; Schon, 1979) while moving forward and back between this and the Define part. The Develop part required learners to provide feedback and feed-forward to the assignments presented by their peers, incentivising "loops of learning" and activating deep learning. Learners worked towards completing the learning outcomes, coherent with the project expectations or requirements, and as negotiated in the PLA. Related to the learning experience, the Develop part allowed different learning pathways and accommodated different expectations because of the specificities of each project.

Demonstrate

This part related to the learning assessment subcomponent (La), which measured the learning process through the summative and formative assessment rubrics. Negotiating the learning assessment subcomponent, in the PLA, helped learners define the results (learning outcomes) and the weighting system, more relevant for their profile. During the learning experience, formative, and summative assessment assignments[67], incentivised learners to criticise, recommend, and suggest improvements for the project. By doing so, they resorted to the learning community and used self-reflective capabilities to decide whether to improve their projects until achieving a satisfactory result for the final delivery, feeling more confident to self-score their own work.

Deliver

The Deliver part related to the final projects' submission (learning deliverables), or evidence of learning evaluated and graded (summative assessment). This FDOC had six (6) learning deliverables, that suited different profiles of the learners and achieved the learning outcomes of the course unit. Each learning deliverable, associated with a weighting system (W1, W2, W3), was adequate to the learning profiles, and could be negotiated in the PLA. The learning deliverables represented prospective results that fulfilled the immediate goals of this learning experience (the negotiated learning outcome subcomponent), but they also evidenced capability-learning since non-linear learning allowed unexpected pathways to surface during the learning experience, thus promoting different results.

[67] For instance, the feedback and feed-forward quizzes, the self-reflection assignment (reflective learning journal).

5.1.4.1 The online learning environment

This section presents the activities, resources, tools, and materials, important to respect the specificities of the fashion design education: collaborative and contextualised, prospective, open / flexible. Part of the Online Learning Experience (o-LE) subcomponent of the model COL4FASHION, the major goal was to build a learning environment that promoted the Collaborative Learning Experience (c-LE) of the FDOC.

FDOC Documents

The Learning Contract and the Manifesto (Appendix B), the learning plan "Assignments and Deliverables" (Appendix F, Table F1) were the key documents of the trial course unit.
The course Manifesto was a higher-level document that stated the learning approach of the model COL4FASHION, based on the learning principles (FDLP)[68]. The Learning Contract document materialised the respective component of the model COL4FASHION, presented the expectations and informed the conditions for the negotiation of the learning experience. The negotiation procedure referred to the completion of the questionnaire Personalised Learning Agreement (PLA) and the individual meeting scheduled at the end of the Discover part. The learning plan "Assignments and Deliverables" (Appendix F, Table F1) resumed all the QAMs of this FDOC, distributed 'throughout' its five parts. Learning Deliverables mapped the outcomes associated with the summative assessment, highlighting the negotiable elements: the "Deliverables" and the "Weighting" (W1, W2 or W3).

Learning Resources and Materials

The personalised learning manager (PLM) / researcher prepared the resources, materials, and learning approved by the research supervisor, and by eleven (11) fashion professionals that responded to a Facebook tool[69], and followed the United Kingdom Joint Academic Coding System (JACS)[70]. The content of this FDOC, *Fashion trends, fundamentals for fashion collection* focused on the stages that precede

[68] Reflective Thinking, Research & Interpretation, Creativity & Imagination, Collaboration & Communication, Complexity and Uncertainty.

[69] Participants selected CORE subjects for the learning in fashion design (at BA / BA Hons levels) and appointed the subjects that "could" or "could not" work in a 100% online environment. The results confirmed the coherency of the content implemented in FDOC.

[70] United Kingdom Joint Academic Coding System (JACS Code) issued by HESA, Higher Education Statistics Agency, later substituted by HECOs, that "classifies academic subjects and modules":
W240 Industrial/product design (100050 HECoS) - The study of/training in the design of industrial and consumer products to meet aesthetic, functional and commercial requirements.
W200 Design studies (100048 HECoS) - The study of design for everyday objects, considering technology and commerce as well as appearance and current art thinking. May involve the use of computers as design tools.

the development of fashion design collections and fashion projects. It had three (3) lessons available in the Define part (Appendix F Table F1), covering trend study, brand study, and the planning and structuring of fashion design collection / project.

The process of creation and production of the resources and materials started in July 2020 by outlining the topics, organising the sources of information (references, examples, videos, websites) and implementing it in Google Slides presentations. Narrating the content through voice recording enhanced the understanding and helped learners to consult the lessons directly. But the content needed to adapt to the different platforms used. In the initial version of the prototype (Google Classroom), the content was uploaded to the platform, while Thinkific used separated files - PDFs and voice recordings. In Moodle LMS, the content, organised as e-learning materials, used Scorm[71] packages, and Rise 360°, a top content creation tool, from Articulate authoring and e-learning development company.

Learning Activities

In the five parts of the course unit learning activities were the point of contact with learners but also worked as instruments of data collection of the research prototype. So, it was important to choose the coherent typology of activities, organise them as Questionnaires and quizzes (Q), Assignments (A) and Meetings (M) and mark them against the indicators of the research questions (RQ), as per the observation script (Chapter 4). Other issues considered, when defining the learning activities were:

- the capabilities they activated (in accordance with the research questions indicators).
- their relevance for the learning experience and as instruments of data collection.
- where, in the five parts of the FDOC, to implement them.
- the tools suggested to complete the activities.

Technology-based tools

The technology-based learning tools used in the FDOC would not only encourage participants to engage and collaborate while completing the activities and developing their projects but would also safely store the information produced. Five recommendations (Table 7) supported by the theoretical framework

71 Shareable Content Object Reference Model. Although Rise 360° produced visually appealing, interactive, and customised content it proved not to work well with LMS Moodle. Learners logged in Moodle, entered the course unit, and then open the Scorm package to access the course. Once they closed the Scorm package, they could not return to the point they left before. Refining the Moodle settings to match the Scorm package, required more time and demanded a longer learning curve from the researcher.

(FDLP), helped identify the characteristics technology-based tools must offer, to contextualise the Online Learning Experience (o-LE) in fashion design. These recommendations acted as a guide to search and select the technology-based tools that facilitated distant group work (mobile and social tools), as well as communication and sharing of ideas.

Table 7 technology-based tools for fashion design, recommendations.

Reflective and craft-based design	enable exploratory, reflective, and creative thinking processes through rapid prototyping (e.g., 3D printing).
Collaborative and contextualised design	motivate user-created content and participative creation, collaborative communities through social networking.
Prospective, open design	interweave products, processes, and users, through integrated physical / digital channels to enhance innovative solutions.

Still the selection of the tools used during the trial course unit had to consider other pragmatic aspects, such as be accessible via the Internet (apps, programs or other technology), the costs (preferably free or affordable), be easy to set up (no technical know-how required), integrate with other services and platforms, being available for mobile and desktop versions (e.g., Mac, Windows, iOS, Android, Web), have a user-friendly interface, and safely storage data. Those criteria, together with the personal experience of the researcher, helped guide the choice for the technology-based tools (Appendix I, Table I3).

The learning platform

The implementation of the FDOC implied study different open learning courses and platforms, learning, learning management systems, publishing, managing, and distributing, and e-learning authoring tools. The fashion design online course (FDOC) first prototype used Google Classroom, the most cost-accessible platform, which required a short learning curve. The second prototype used Moodle LMS, provided liberally by the company the researcher worked for and Thinkific, (a free online platform for learning content development and distribution). Finally, the third and final version of the trial course unit remained in the Thinkific learning platform, which was easy to develop (for the researcher) and easy to use (for the participants). The implementation and management of the platform were easy to master, which allowed improvements during the observation period of the trial course unit.

Communication channels

A Google Account, created for the research, supported the collaborative online learning experience (c-LE and o-LE) and comprised: Gmail, Google Docs, Sheets, Slides (used to organise the content into lessons), Forms (used to structure questionnaires and quizzes), Google Calendar, Google Meet and the YouTube application. Five group meetings happened in three different periods: August, September, and November 2020 and each session took between fifteen to third minutes. All group meetings were recorded using the Movavi Multimedia Software, also used to record the lessons and live presentations. Those were published (as non-listed videos) on the Youtube channel and shared with participants. Canva graphic design platform was used to create all the stationery, the communication and promotional material[72] (Appendix I, Figures I1, I2 and I3), as well as the course images, video tutorials and the course unit certificate (Figure 14)

Figure 14 - example of a certificate of participation.

[72] "Merry Christmas" promotional card on FDOC YouTube channel https://youtu.be/cchBHjlVRl0

5.2 Results from Q1_application questionnaire (sampling results)

This questionnaire uncovered the opinions of professionals about fashion education. The *Q1_application form* helped characterise the respondents and among them identify potential participants of the course unit. It received forty-eight (48) responses. From these, three persons responded in WenJuan and other forty-five (45) used Google forms. Respondents came from direct and secondary contacts of the professional and personal network of the researcher. They were between 25-34 and 35-44 years old, mostly female, (75,5%) and lived in Brazil (54%) and Portugal (21%)[73]. Twenty-three (23) respondents had a higher education degree in fashion design and three (3) were studying in similar areas. They were self-employed professionals (Q1.8), working as *Design/pattern making/sketching* (Q1.7). This had an impact on their perception on training and education in the sector, their availability for study and thus their urgency in learning from alternative sources. This also influenced their interest in the trial course unit, their interaction with the learning experience and with the learning community.

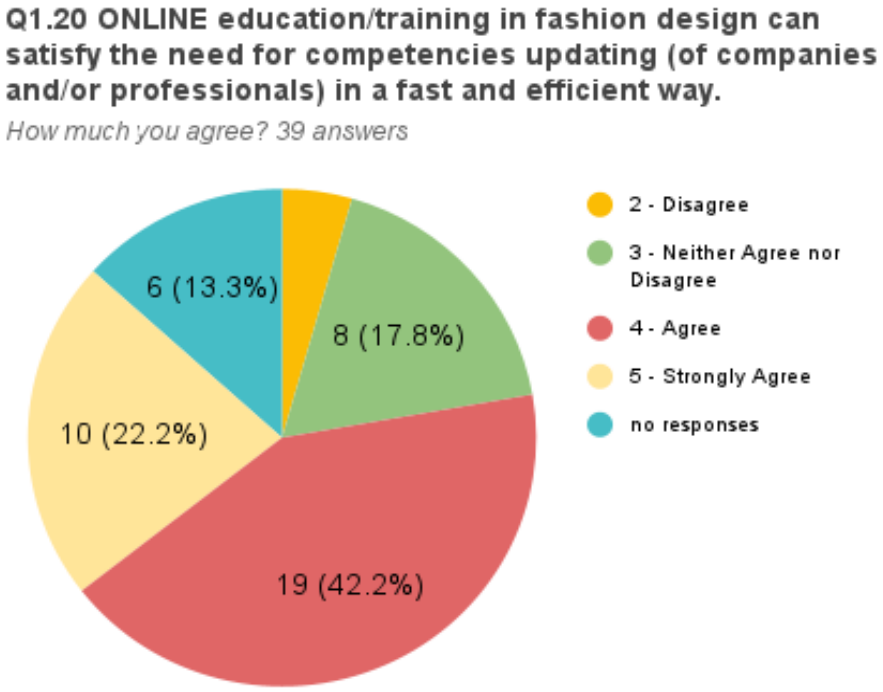


Figure 15 - Q1_application form, results from question 20.

[73] 26% of the respondents lived in Malaysia, Nigeria, Bulgaria, Singapore, China, Saudi Arabia, India, and Ecuador.

These professionals considered higher education relevant for the career in the sector but were not completely satisfied with the level of education in fashion design. Still, they considered that online education in fashion design can satisfy the competence updating for companies and professionals (Figure 15). Their answers also highlighted the low level of professional incentive in the fashion market, which influence people's willingness to pursue or not continuous education and opportunities to improve themselves. Respondents (16%) disagreed that the valorisation of qualifications even exists. Since most of the respondents identified themselves as self-employed, this reinforced the prompt to 'survive' in the market, which gives little space to formal education. Therefore, they participated in different types of training by their own initiative and the majority participated in courses offered by "*qualified and accredited educational institutions (formal education)*", with 16.7% participating in "*Free courses (non-formal education)"*. The main barrier for not to joining education/training in fashion design was the schedule incompatibility.

Their responses illustrated some predisposition to join an online course. From thirty-two answers (32), twenty-two (22) had participated in *Online education/training in fashion design* (Q1.13, 48.9%). Nineteen (19) responded to have joined *100% Online courses* or *"Education/training in real-time through videoconferencing/teleconferencing, web-conferencing, etc"*, which was expected in a time in which remote working was becoming more common due to Covid-19 pandemic.

The last questions of the questionnaire related to the research question[74] and opened the opportunity to invite respondents to join the trial course unit. They were, overall, aligned with the assumptions made at the beginning of this research. They also indicated that providing content up-to-date and relevant to the market was the factor they considered more relevant (35 out of 39 answers, in Figure 16) for continuing studying.

What became clear was that the delivery model of the course unit or the academic accreditation was not relevant factors (Q1.21). From thirty-three (33) wanting to participate in the course unit and participating in the research, the majority (31) was motivated by updating or improve the knowledge / skills in fashion. Finally, most of respondents would be able to allocate 3 to 5 hours per week (Q1.24), which was far less than expected for the course unit.

[74] Q1.20 "ONLINE education/training in fashion design can satisfy the need for competencies updating (of companies and/or professionals.

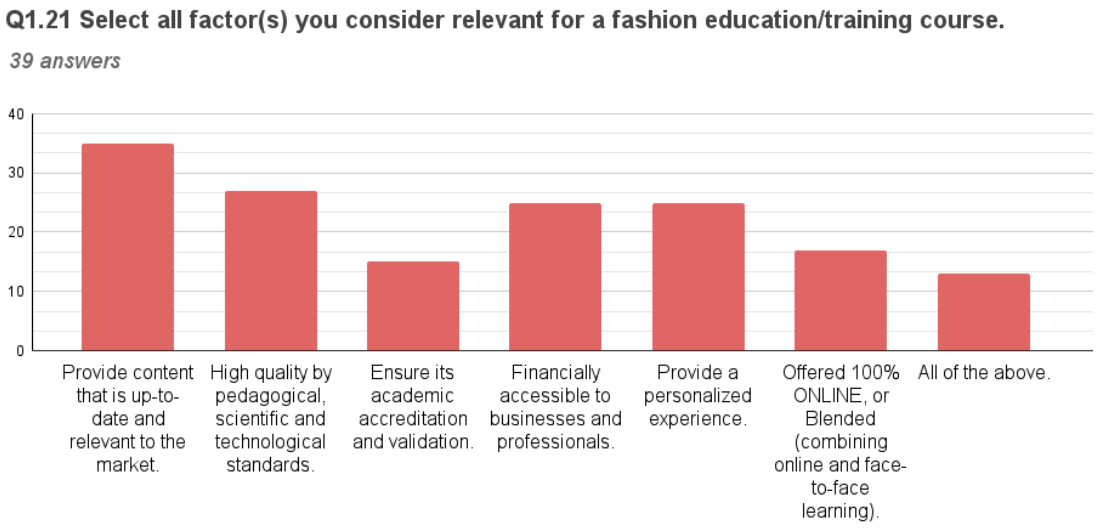


Figure 16 - Q1_application form, results from question 21.

5.2.1 Sample characterisation

The sampling process continued, using the questionnaire *Q1_Application form* and thirty-eight (38) accepted to join the trial course unit. Participants were enrolled in three different groups, in two platforms: sixteen (16) people in LMS Moodle and twenty-two (22) in Thinkific online platform. This allowed to test different entries and schedules. In Moodle, the group (G2) had a fixed starting and finishing date and on Thinkific, one group (G1) had a flexible schedule and participants could choose when to start but need to respect the period defined for the trial course unit (approximately 2 months). The second group (G3) in Thinkific, had fourteen (14) participants. It was an exclusive group for students referred from one of the partners, a fashion education institute.

From the participants that joined the trial course unit, five were professionals (profile P1): Andy, Carrie, Erin, Maggie, and Nadia. Seven participants were professionals representing profile P2: Carol, Carly, Elle, Julie, Li, Renée, and Vicky. Finally, three participants, Debbie, James, and Vicky, represented students or people who appreciate fashion (profile P3). The groups started the learning experience between September 2020 and November 2020. In January 2021, nine participants had successfully completed the trial course unit it. This was considered satisfactory, not due to the number, but the rich inputs, opinions, testimony, and materials they were able to provide. From the participants seven responded (Q7_1) that this was the first time they studied fashion design in a 100% online environment and two informed to have previous experience in learning in a 100% online environment.

5.3 Results from the learning components of the model COL4FASHION

This section presents the results obtained by the instruments of data collection questionnaires, assignments, and meetings (QAMs), during the observation period of the trial course unit, from July 2020 to January 2021. The aim of the results analysis was to know if the learning components of the model COL4FASHION (Appendix A, Table A1) triggered the research questions (RQ1, RQ2, RQ3) indicators (Appendix E, Table E4). Therefore, the organisation of this section respected the learning components and subcomponents of the model: the Learning Discovery (LD), the Learning Contract (LC), and the Learning Experience (LE).

5.3.1 Results from the Learning Discovery (LD) component

This section presents the results from the charting stage of the framework analysis. The aim was to understand if the QAMs triggered the indicators of the research questions, as expected, while participants completed the activities of the first part of the trial course unit, the Discover part. The procedure followed the parameters previously defined for the QAMs, considering the expected indicators as "MET", "not MET" or "partially MET" when identified in the QAMs analysis, done by the researcher or by the participants' answers in the questionnaires and quizzes. In accordance with the analytical matrix (Appendix H, Table H1), the Learning Discovery (LD) had thirty-three (33) expected indicators. The Summary of the Analysis, QAMs (Appendix J, Table J1) demonstrated that the learning subcomponents (Learning Community and Learner-centred) triggered the expected indicators, thus confirming the Learning Discovery component in the model COL4fahion. The Table J1 also informed the results breakdown combining the results identified by the researcher (Evidence from the analysis of the QAMs[a]) with the results from the quiz Q2_about Discover[b], responded by the participants.

5.3.1.1 Learning community, subcomponent (LCo)

This subcomponent expected to trigger twelve indicators: six (6) related with research question (RQ1), two (2) with research question (RQ2) and four (4) with research question (RQ3). The QAMs were one assignment (D1P2.2_Breaking the ice), one meeting (D1P3.1_Group Meeting) and one quiz (D1P3.2_question about the Group Meeting). The analysis of the results indicated that the learning community subcomponent triggered (MET) eleven (11) out of twelve (12) expected indicators and activated two unexpected indicators (not expected, but MET). Although indicator q1_2 was "partially MET", the RQ1 Collaborative Learning was confirmed, as well as RQ2 Prospective Learning and RQ3 Personalised Learning.

Figure 17 - examples of D1P2.2_Breaking the ice

Results breakdown - D1P2.2_Breaking the ice

In this assignment participants introduced themselves (Figure 17 and Appendix K, Figure K1), creating and publishing a presentation about their motivations and expectations for the trial course unit. This would facilitate connections and incentivize the formation of a learning community. In accordance with the parameters defined by the qualitative data analysis procedures, the assignment was considered "partially MET", triggering three (3) out of four (4) expected indicators: *q1_1 contextualised, constructed learning, q3_1 learner-centred* and *q3_2 self-determined, capability-based learning*. However, the assignment failed to meet the indicator *q1_2 learning community and extended community*, the main goal in this subcomponent (learning community). Despite posting their own "covers" classmates did not comment or respond on the others. This was because participants joined the course unit in different groups, started in different timeframes and used separate platforms.

Results breakdown - D1P3.1_Group Meeting

The *D1P3.1_Group Meeting* welcomed the participants, presented the platform, the learning components, and enabled participants to meet, share their expertise, reasons to join the trial course unit and expectations about it. The participants joined the meetings in different moments in August 2020, two sessions in September 2020 and two sessions in November 2020.

Figure 18 - example of the D1P3.1_Group Meeting

The *D1P3.1_Group Meeting* had five (5) expected indicators and the transcripts were processed in two steps. The first identified evidence of the participant's professional background, motivations, commitment with the course unit and with the research project. The second step, focused on the analysis of the expected indicators.

During the first step of the transcripts analysis (familiarisation stage), the results demonstrated that participants identified themselves within the three main profiles[75] (as initially envisioned). Business owners, like Elle[76] or Julie[77]aimed to enhance professional connections. Andy[78], was interested in the online learning model, similarly as Maggie, Nadia and Erin, fashion teachers (Figure 18 and Appendix K, Figure K2). Experienced professionals that were not directly related to fashion, but worked with fashion brands, such as Carly, Carol or Li expressed their desire to have their own fashion brand or business. Renée, Carrie, Carol, and Li also seemed keen to align their professional path with future projects in fashion. Participants that were currently studying in fashion design or related courses, like James, Terry, Debbie, and Renée, aimed to improve their professional skills and enter in the job market. Terry and James worked as freelance fashion producers and had no intentions to join higher education, preferring short courses on their areas of interest.

The second step of the transcriptions analysis resorted to a more structured approach and synthesised the evidence of five (5) expected indicators (Appendix K, Table K1), revealing one unexpected indicator. All three expected indicators (q1_2, q1_3 and q1_4) of research question (RQ1) collaborative learning were triggered and appeared in the participant's discourse. Those professionals revealed a desire to create a network, through a learning community, exchanging collectively their individual paths. Renée discourse, for instance, revealed indicator q3_1 learner centred (RQ3 Personalised Learning), her will to enter in the fashion market as an employee for a company or launching her own fashion brand. The willingness to start their own business, to work independently, was a common factor between the fashion professionals with longer experience (Carrie, Carly, and Li) and revealed the unexpected indicator q3_2 self-determined, capability-based learning, reinforcing the research question RQ3, Personalised Learning. These indicators revealed learner's capability of thinking about their acquired knowledge, their practice and to reflect on new ways to use it.

Carrie, for instance, graduated in fashion design and was working as a quality manager within a Brazilian clothing industry. She revealed dissatisfaction with her role in the fashion industry and insecurity on

[75] P1, professionals seeking to improve understanding about trend analysis theories, concepts, and methods. P2, professionals seeking to enhance their competence, translating it to the industry, to a brand, or a collection, or even to enrich their own portfolio. P3, students or people who appreciate fashion, seeking to continue studying the field.

[76] Graduated from NIFT (National Institute of Fashion Technology, India), and owns a brand that designs and resales Indian style garments to European markets.

[77] Fashion consultant from Brazil.

[78] Owner of a private education institution, with 20 years of experience in the fashion sector.

"*where to place her competences*". She demonstrated willingness to align her profile to the course unit goals but reinforced that she was motivated by the need to question her practice as a fashion professional and the sector. Her discourse indicated not only her readiness for contextualised, constructed learning (non-expected indicator q1_1), but for self-determined, capability-based learning (indicator q3_2). Reflecting on her experience to plan more meaningful learning and professional pathways, she was, unknowingly, in a process of double-loop learning (q2_2).

As fashion teachers, Nadia, and Erin, revealed more defined career paths, they also demonstrated the propensity to continuous learning (indicator q3_1) as a way not only to progress in their areas, but to improve themselves, challenge their theories, values and assumptions and ultimately better educate future fashion students. Once more, the indicator q2_2 was triggered in the group meeting, supporting research question RQ2 (Prospective Learning).

The group meetings proved valid to help participants meet the learning community, identify similar competences or different perspectives about the fashion sector. This proved valid for Renée, Carrie, and Joy (G3), who worked together in Trello to resolve the initial assignments of the Discover part and evidenced indicators q1_2 (learning community and extended community) and q1_3 (co-learning). Working together, the group (G3) reinforced each other's motivations and purpose, increased their trust, and created a sense of belonging. By sharing their experiences, Li, Andy, and Carol posed valid questions about current issues on fashion, such as textile waste management in medium and small companies, as well as the innovation models for the sector. Ultimately this reflected in the topic of the complementary assignment *D1P4.1_Fashion Circle* that Carol published in the platform about fashion and sustainability, reinforcing expected indicators: q1_1 contextualised, constructed learning, q2_3 non-linear learning and q3_1 learner centred.

Results breakdown - D1P3.2_Question about the Group Meeting

This quiz (Q) aimed to confirm the expected indicators for the *D1P3.1_Group Meeting* (M). The quiz received fifteen (15) answers (ten participants that joined the group meetings and five that watched the recording). Most participants (> 50% of the answers) acknowledged that the group meetings were "Extremely and Very Important" (Appendix J, Table J1) to prepare for the learning experience, triggering expected indicators: q1_2 learning community and extended community, q2_2 double-loop learning and q3_1 learner-centred.

5.3.1.2 Learner-centred, subcomponent (LCe)

This subcomponent expected to trigger twelve (12) indicators: three (3) related to RQ1 Collaborative Learning, three (3) related to RQ2 Prospective Learning and six (6) related to research question RQ3, Personalised Learning. The QAMs were one questionnaire (D1P2.1_ Self Diagnosis, SD in Appendix K, Table K2), with the submission of the motivation letter, one meeting (D1P5.3_Individual Meeting), and one quiz (D1P5.4_question about Individual Meeting). Although complementary, the assignment (A) *D1P5.1_My Fashion Brief* incentivised participants to start their *D7P2.1_Reflective Learning Journal*, to be delivered at the end of the course as part of the learning assessment (LA) subcomponent. The analysis of the results indicated that the learning centred subcomponent triggered (MET) all twelve (12) expected indicators and activated two unexpected indicators, verifying the research questions, namely the RQ3, Personalised Learning.

Results breakdown - D1P2.1_Self-Diagnosis questionnaire

The questionnaire received fourteen (14) valid responses. In accordance with data analysis procedures and the parameters of the QAMs, results were considered "MET" when obtained >=50% of the answers (>= 7 answers). The results analysed in two steps, first recovered information that characterised the participants profiles, learning style and motivations and then focused on questions related to the expected indicators.

Participants (=50% of the answers) had "Moderate" level of professional experience with fashion collections and with fashion trends research. They were familiarised with the contents of the course unit (Appendix K, Figure K3), which meant they could provide valid feedback on the subject and promote a good level of discussion. The answers demonstrated that the Learning Experience (LE) was aligned with the participant's previous expertise and anticipated the areas they would develop the projects. Most participants expected to "*translate the knowledge and skills*" to the fashion sector, right away, confirming the expected indicator q1_1 contextualised, constructed learning, and aligning with profile 2, fashion professionals (Appendix K, Figures K4 and K5). They also expected to know more about the topics of the course unit (profile 1) and continuing studying fashion (profile 3). These results helped to trigger expected indicators q3_1 learner-centred and q2_3 non-linear learning. Eleven (11) participants (>50% of the answers) related the course unit with their personal or professional interests (Appendix K, Figure K5), helping to trigger the expected indicators q1_1 contextualised, constructed learning, q3_1 learner-centred and q3_2 self-determined, capability-based learning. Most participants (50%) considered Collaborative, Flexible and Personalised Learning as "Very Important" to the learning

experience (Appendix K, Figure K6), which triggered the expected indicator q1_1 contextualised, constructed learning, q2_3 non-linear learning and indicators q3_1 learner-centred, q3_2 self-determined, capability-based learning. Finally online learning revealed to be “Very Important” by most participants (9 answers, >50%).

Results breakdown - motivation letter submission

The *D1P2.1_Self-Diagnosis questionnaire* required participants to submit a Motivation Letter. Twelve (12) participants submitted the motivation letters, informing their intentions and commenting on the topics they considered relevant in the trial course unit (expected indicator q1_1), sharing their expertise, background, and uncertainty relating to their future (expected indicators q3_1 and q3_2). While finding the reasons for joining the trial course unit, participants related the learning experience affecting their professional future (expected indicator q2_3).

The analysis of these documents adopted a deductive approach, first mapping the connections between the content with the predetermined, expected indicators, related to the research questions, and then analysing participants' narratives (Appendix K, Table K3). Participants commented their motivations to join the course unit, and shared future goals, experiences, and uncertainties, as well as plans for future projects (Figure 19 and Appendix K, Figure K8). The analysis of their motivation letters allowed the creation of conceptual categories confirming participant’s profiles: professional improvement and investment on their own fashion brand/business (Appendix K, Figure K7). These categories helped define the approach of the learning experience in the trial course unit.

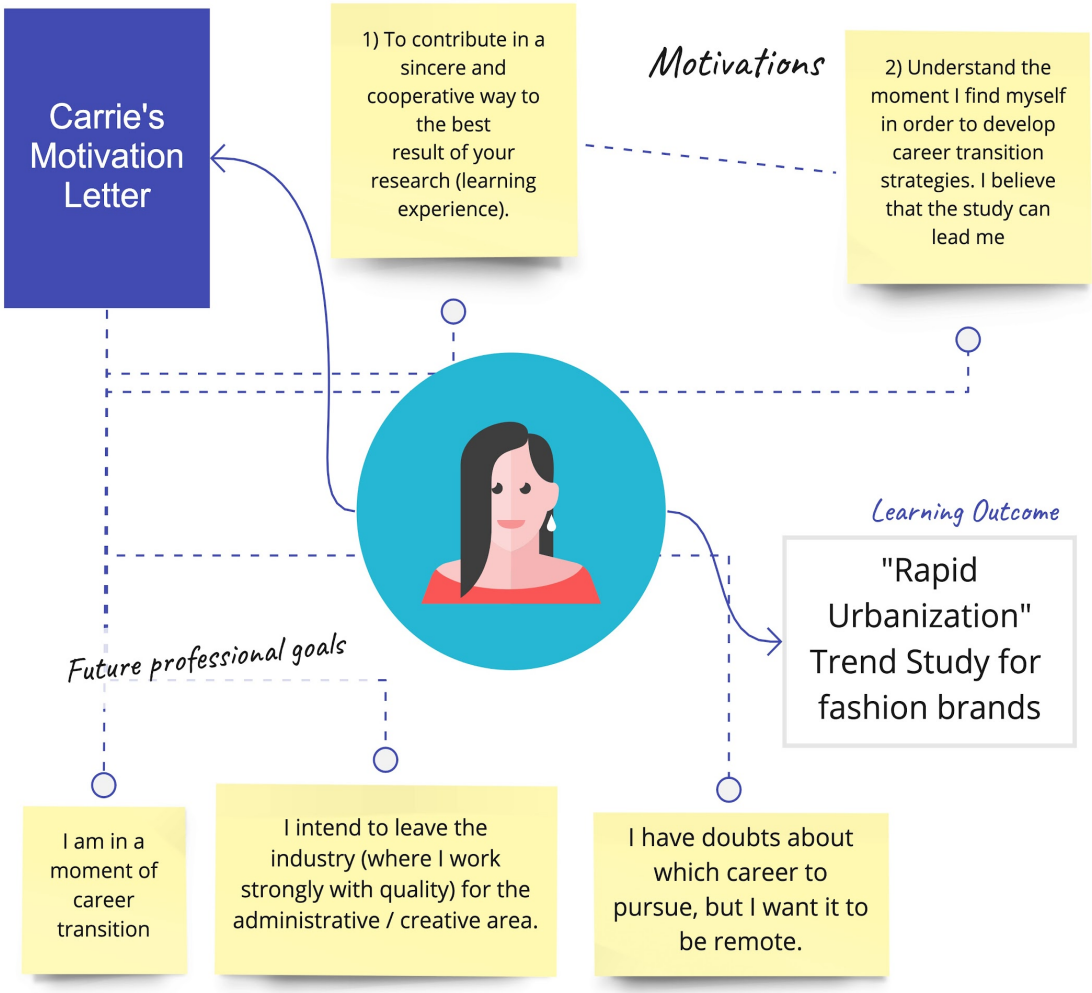


Figure 19 - example of the Motivation letter (Carrie)

Results breakdown - D1P5.3_Individual Meeting

D1P5.3_Individual Meetings (M) were scheduled after participants completed the Personalised Learning Agreement (PLA) questionnaire to review and confirm the negotiable elements of the Learning Contract. It also aimed to clarify participant's doubts and align their expectations for the course unit with the unit goals. Ten (10) participants scheduled and joined the Individual Meetings and received the final version of the PLA by email. The analysis of the transcriptions resorted to the mapping and interpretation of the content, establishing a relation between the participant's narratives and the expected indicators of the research questions. The results informed that participants identified the expected indicators and revealed other two unexpected indicators: q1_2 learning community and extended community and q2_3 non-linear learning (Appendix K, Table K4). One of the main aspects revealed during the analysis

of the individual meeting was the difficulty to compartmentalise the participants discourse to meet only one indicator. This reinforced the intertwined dynamics between the research questions (RQ1, RQ2, RQ3) and its indicators. Furthermore, unexpected indicators, such as q2_3 non-linear learning, reinforced the expected ones (q1_1 contextualised, constructed learning), as participants proposed contextualised learning outcomes, without deviating from the core content or the learning goals (Figure 20 and Appendix K, Figure K9).

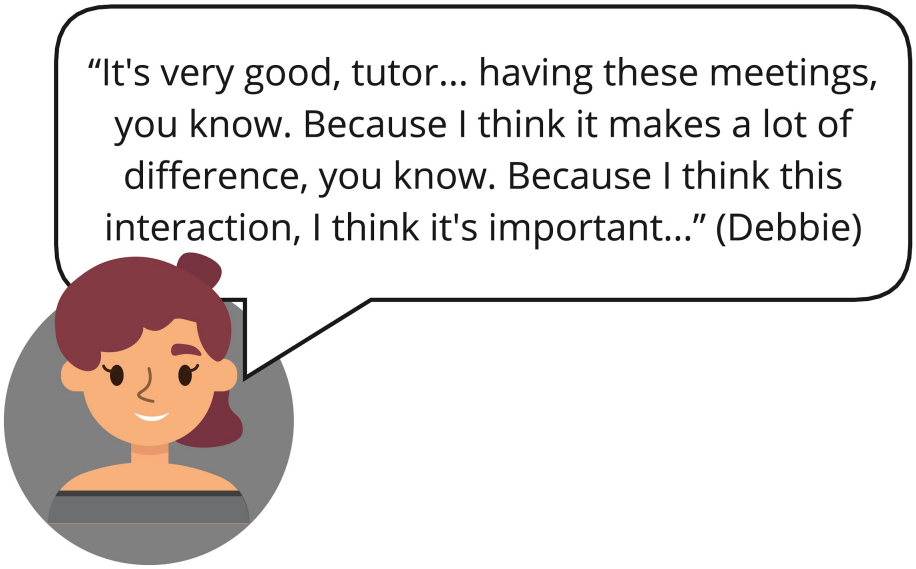


Figure 20 - example from the D1P5.3_Individual Meeting

While some intended to plan and structure a fashion collection for their fashion brands, others saw the opportunity to use or surpass the learning contents (indicator q2_3) aligning their project into similar fields, such as the promotion of fashion collections (James). During the individual meeting, for instance, Carol preferred to discuss study cases, examples of fashion and communication projects that surfaced during the Covid-19 pandemic. So, the expected indicator q1_1 was not only triggered by participants bringing closer the professional sector to the learning experience, but also using their learning experience, to open professional pathways (q2_2 double-loop learning and q2_3 non-linear learning), invest in their self-development in a lifelong learning perspective (q3_2, self-determined, capability-based learning) and assuming responsibility for their own learning. This was evident in the discourse of participants with a longer career in the fashion sector, and with a degree of frustration about their professional “routine”. They shared previous experiences, and future expectations for more meaningful

professional pathways, reinforcing the information presented in the Motivation Letters (assignment *D1P2.1_Self Diagnosis, SD*).

Results breakdown - D1P5.4_ Question about Individual Meeting

This quiz (Q) aimed to confirm the expected indicators for the *D1P5.3_Individual Meeting* (M). The quiz received eleven (11) answers and all participants considered the individual meeting "Extremely important" to understand and negotiate the PLA, triggering expected indicators: q1_1 contextualised, constructed learning, q2_2 double-loop learning, q2_2 double-loop learning, q3_1 learner-centred and q3_2 self-determined and capability-based learning (Figure 21).

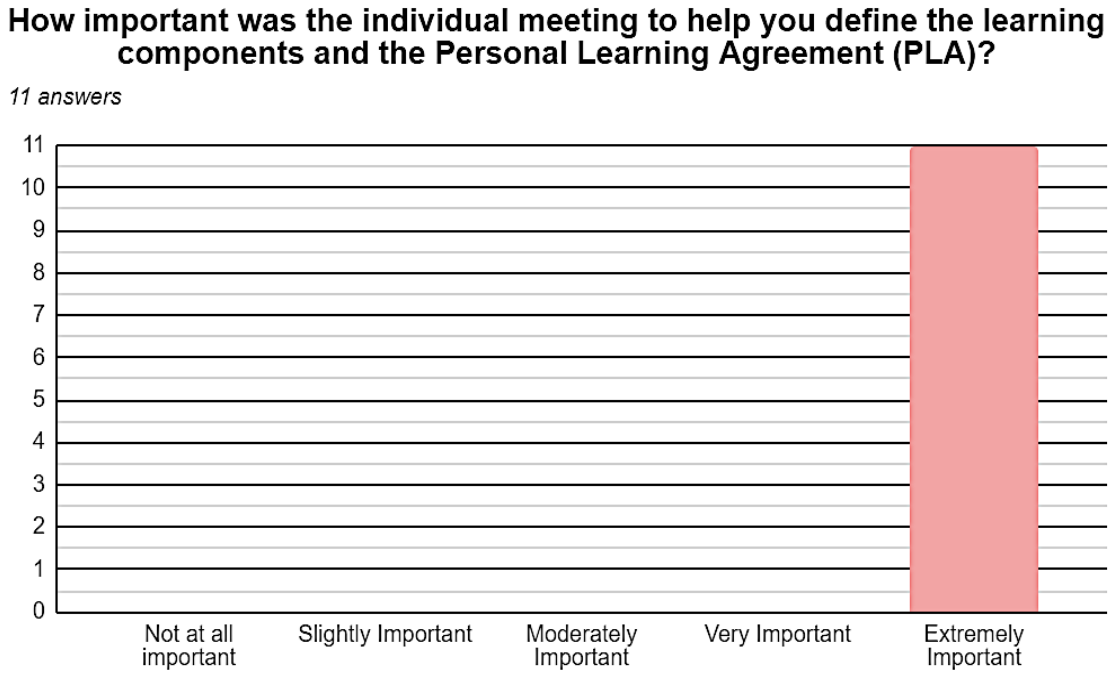


Figure 21 - importance of individual meeting for the PLA

Results from Q2_about Discover

The quiz confirmed participants' opinions about the capabilities triggered (expressed by the indicators) while completing the mandatory QAMs of the Discover part. It also collected participant's opinions about the Personalised Learning Agreement (PLA), of the Learning Contract component (Appendix K, Figure

K10). The quiz received eleven (11) answers[79], with the results included in the analytical matrix of the learning component (Appendix J, Table J1).

Overall, the results indicated that participants partially recognised the indicators of research question RQ1, Collaborative Learning, but few recognised the indicators of research question RQ2, Prospective Learning. Only two participants identified the research question RQ3, Personalised Learning. It is relevant to highlight that the expected indicator q1_2 scored very high (eight answers, >50%) in the *D1P3.1_Group Meeting* and the unexpected indicator q2_1 received six (6) answers in the *D1P5.3_Individual Meeting*. This meant that the meetings helped to trigger the learning community subcomponent in this part of the trial course unit (Discover). The results also indicated that the assignment *D1P2.2_ Breaking the ice* was 'partially MET' the RQ1, Collaborative Learning, and "not MET" (<=40%) the RQ3, Personalised Learning confirming the result from the assignment. Finally, participants did not identify the expected indicators of research question RQ3, Personalised Learning when responding about the *D1P5.3_Individual meeting*. When participants responded to the questionnaire Q2_about Discover, they did not recognise the expected indicators of the research questions RQ2 and RQ3. But, when the researcher interpreted the results, it was possible to identify the indicators in the evidence participants left when completing the QAMs[80].

5.3.2 Results from Learning Contract (LC) component

The component connected the Learning Discovery (LD) with the Learning Experience (LE) components. As a document it was available within the online platforms and participants read it before completing the *D1P6.1_Personalised Learning Agreement* (PLA) to understand the learning model and the criteria for negotiating the learning components (Figure 22).

Table J2 (Appendix J) indicates the PLA questionnaire (marked with the five expected indicators) participants needed to respond to and the quiz (marked with four expected indicators). The PLA was a subcomponent of the Learning Contract and the most important instrument of data collection (a questionnaire with the negotiable fields of the Learning Contract) since it entailed the process of

[79] In accordance with the parameters of QAMs the indicators would be considered "MET'" if >=50% (>=5.5 answers), 'partially MET' if >=40% (>=4.4 answers) and 'not MET' if <40% (<4.4 answers).

[80] For instance, in the complementary assignment *D1P5.2 Future in/for Fashion*, James researched issues he considered relevant for the fashion sector and proposed a project for a fashion production company focused on 2nd hand clothes. This demonstrated he was able to reflect about his role as active agents and envision themselves in the future of the fashion sector. (RQ3 indicators)

negotiation and personalisation. Without the negotiation of the Learning Contract, through the PLA, the model could not fulfil its principles. So, although the question about the PLA was in the quiz Q2_about Discover, the results are presented at the end of this section to facilitate the interpretation of the results. The results indicated that all indicators were "MET" in the negotiation of the learning experience, and other two unexpected indicators were triggered (Evidence from the analysis). However, when responding about the PLA in the quiz Q2_about Discover, participants did not recognise any indicator. Thus, the analysis of the PLA subcomponent was "partially MET".

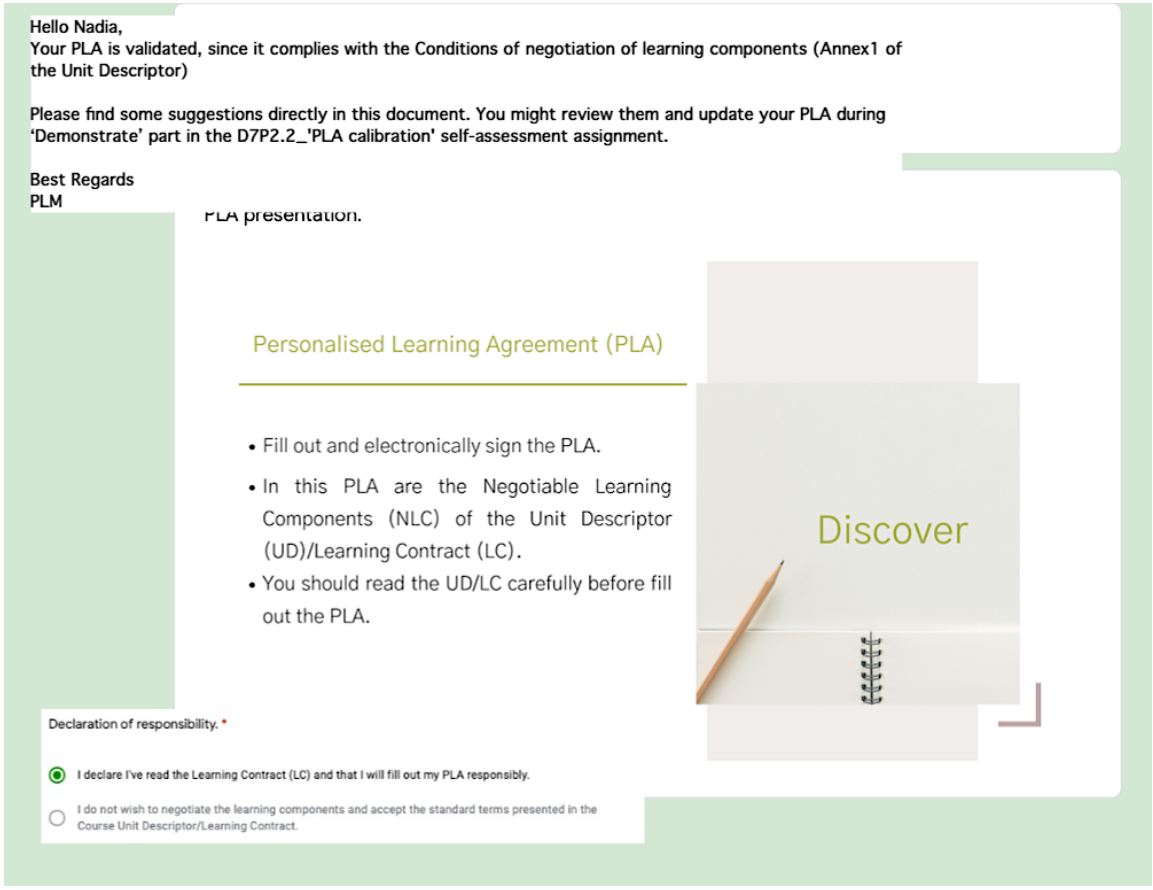


Figure 22 – Nadia's PLA, example.

The questionnaire Personalised Learning Agreement (Appendix L, Table L1) had four (4) main sections, with eighteen (18) questions about the negotiable learning subcomponents of the Learning Experience (LE): Learning Content, Learning Outcomes, Learning Assessment and Learning Methods. It obtained eleven (11) valid answers.

The analysis of the results followed the framework analysis procedures and started by collecting and combining the responses from the different groups of participants, separating, and categorising the results obtained with the closed and open questions. Next, this section presents the results break-down of each negotiated learning subcomponent.

Results break down - Negotiating the Learning Content

This subcomponent had one closed question (Appendix L, Figure L1) and one open question (LC-2). The results demonstrated that most of the participants recognised the relevance of the four topics of the content, triggering the expected indicator q1_1 (contextualised, constructed learning). The topic *Fashion collections - planning and structuring* scored a little below than expected, which might indicate the familiarity participants had with it and that the focus of interest of most of the participants was not in planning and structuring a fashion collection, but study more about fashion brands and trends. Those topics were considered "Extremely Important" by six (6) participants and the topic *Fashion collections concepts* was considered "Very Important" by seven (7) participants. Still, two (2) participants considered *Fashion trends* as "Moderately important".

The open question (LC-2 in Table 8) revealed that not only they suggested topics that would make sense for them, but subjects that were also aligned and respected the course objectives. When proposing new contents, they had to reflect and identify the areas or subjects they needed or wanted to know more about, evidencing the expected indicators of the research questions RQ3, Personalised Learning, as well as the expected indicators q1_1, q2_2 (double-loop learning) and q2_3 (non-linear learning).

Table 8 negotiating the learning content

Question	Results
Based on the previous question, is there any other content that you would want/need to deepen your knowledge and skills at? (LC-2). open question	• fashion brands and collections (three comments) • fashion trends (one comment) • fashion photography (one comment) • fashion consumption and sales (one comment) • sustainability, technology, production (one comment)

Results break down - Negotiating the Learning Outcomes (Lo)

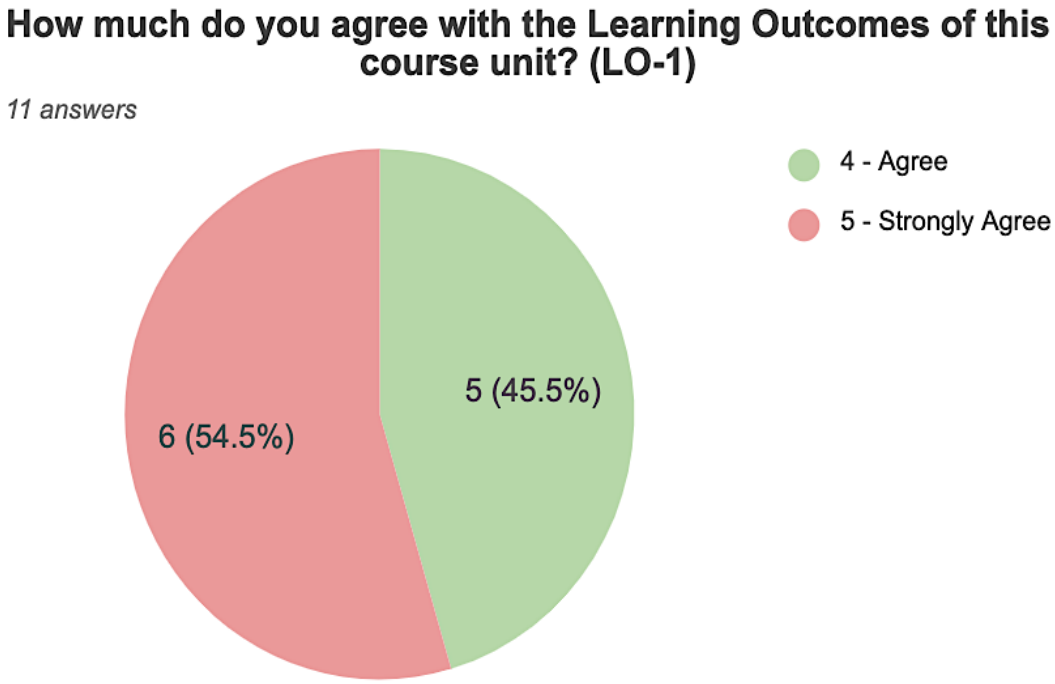


Figure 23 - Negotiating the Learning Outcomes

The PLA gave participants the opportunity to discuss the outcomes they wish to achieve at the end of the learning experience, without deviating from the learning goals, but presenting results that were more meaningful to their professional lives. As indicated in Figure 23, most participants (five answers) "Agreed" and "Strongly Agreed" with the defined LO (LO-1). This triggered expected indicators because participants had to reflect about the learning outcomes in advance, plan the learning path and prepare the way they would approach the course unit to obtain the expected results. This made them more engaged with the evidence of the learning assessment they needed to present. Participants had the opportunity to include other outcomes (Table 9). Their answers triggered the expected indicators for the research question RQ3, Personalised Learning (responses a, b), and indicators q1_1 contextualised, constructed learning and q2_3 non-linear learning. Overall, the comments demonstrated the importance participants put in presenting outcomes that met the expectations of the job market (expected indicators q1_1 and q3_2 self-determined capability-based learning), reinforced in question LO-3 (Appendix L, Figure L2) with ten (10) answers selecting option c) as a sign of learning achievement.

The results informed that, when thinking about the learning outcomes, participants recognised the expected indicators and helped to verify the Learning Contract component.

Table 9 negotiating learning outcomes

Question	Results
What other outcomes do you expect to be able to do or to know, once finishing this course unit? Please itemise. (LO-2) *open question*	a) 'Be able to understand more about fashion/photography trends' b) "To believe that my ideas are possible in fashion market". c) "I am satisfied with the job proposal" and "All above - LO1 / LO2 / LO3" d)NA

Results break down - Negotiating the Learning Assessment (La)

Participants were able to negotiate some components of the summative assessment (the learning deliverables and the weighting type). Results demonstrated that participants were able to reflect on the evidence of learning required in the assessment and chose the weighting system associated with the learning deliverables to meet the specificities of their profiles[81]. This triggered indicators RQ3, Personalised Learning, as well as indicators q2_2 double-loop learning, q2_3 non-linear learning and q1_1 contextualised, constructed learning were triggered as well.

Results of the question LA-1 (Appendix L, Figure L3) demonstrated that most of the participants (>50%) were satisfied with all the required evidence of learning assessment. By responding to the question, they acknowledged the different evidence of learning assessment they needed to present and prepare for the assessment activities. The answers triggered expected indicators q1_1 (related to options a and d) and q3_1 (related to option c) as well as the unexpected indicators: q1_3 co-learning (reinforced by option b) and q1_4 critical FB/FF triggering reflective thinking (reinforced by option e).

Similarly, most of the participants (Appendix L, Figure L4) were "Very Satisfied" with all defined deliverables, triggering the expected indicators: q1_1 contextualised, constructed learning, q2_3 non-linear learning, as well as q3_1 learner-centred and q3_2 self-determined capability-based learning. One participant (James) responded, "Slightly Satisfied" in the question, and proposed other

[81] 7 participants chose weighting 2, related to profile 1 and 4 participants chose weighting 3, related to profile 3.

deliverables: "*I am not going to make a fashion collection but a fashion production for a fashion brand"*. James demonstrated he was able to negotiate and personalise the deliverable, maintaining coherence with the expected learning goals and adjusting it with the evidence of the learning assessment.

The deliverables that scored higher (options a, b, and c) reinforced the needs and expectations related to the profile of the participants. On the other hand, the deliverables related to self-reflection (option e), sharing, and communicating the projects (option f) presented lower scores.

Finally, participants related a grade (%) to the expected learning outcomes (LA-5, Figure 24) which helped them to envision the level of achievement, placing the expectations to themselves, not only in the learning experience. This triggered the indicator q3_1 learner-centred, helping participants work toward a defined goal, aligning their learning expectations with their learning needs.

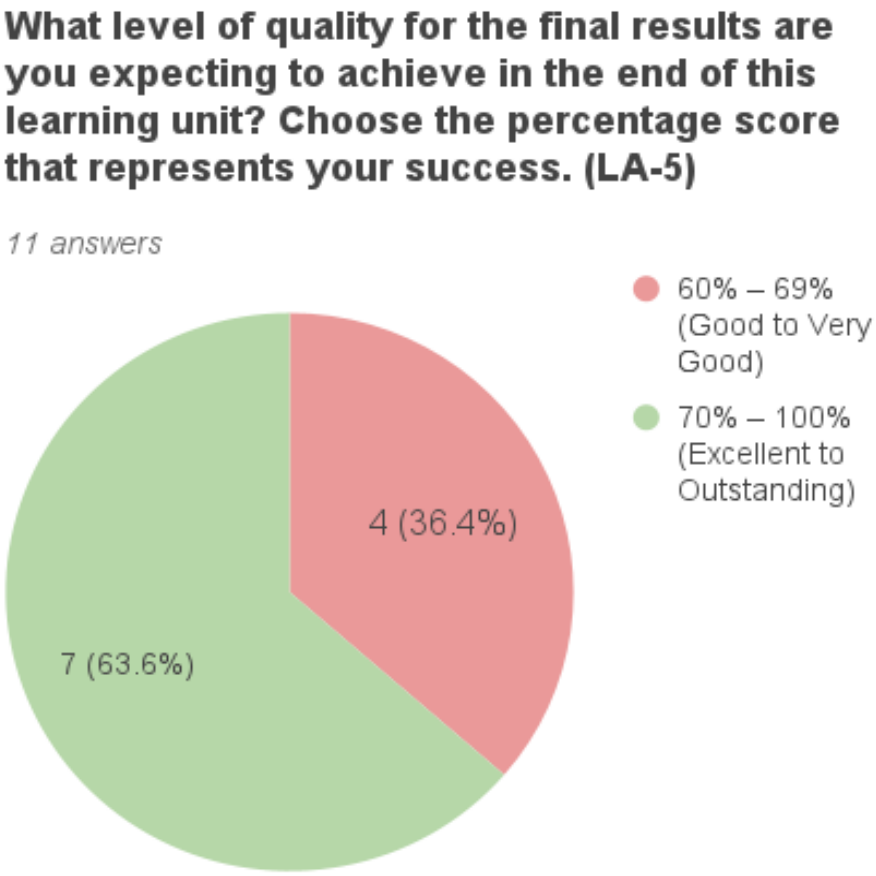


Figure 24 - participant's expected level of achievement.

Results break down - Negotiating the Learning Methods

Although not a subcomponent, participants negotiated the learning methods (activities, tools, and resources) to employ, which related to the o-LE subcomponent. While responding to these questions, participants were being stimulated to review their abilities and skills and consider what they were willing to learn and experiment with. Results evidenced that most of the participants (nine answers) preferred Tutorials, Online platform (content and activities), Tutoring and individual studies (eight answers). This incentivised participants to recover what they already knew and prepare to employ their skills in a different learning setting, triggering the expected indicators of the research question RQ3, Personalised Learning.

Participants also indicated the expected period for completing the trial course unit (LM-3) and allocated time to each part (LM-4 in Appendix L, Figure L5). This helped participants to take responsibility for their learning (activating the expected indicators q3_1 learner-centred and q3_2 self-determined, capability-based learning), and plan the learning experience. When comparing the planned time allocated with the real time used (questionnaire Q7, question Q7.5 as in Appendix L, Figure L6), most participants reported having spent less than 12 hours to complete the assignments in the Course Unit Overview, Discover, Define and Deliver and over 12 hours to complete the Develop part. Most of the participants (seven answers) also indicated to have spent 12 hours or less to complete the Demonstrate part. Overall participants understood the workload required in the first three parts: Discover, Define and Develop (> = 6 hours per week for each part). It was estimated that to complete the Develop assignments, for instance, participants would require at least 9 hours (two to three weeks), since more independent study would be necessary to develop the projects. Renée allocated 16 hours per part and Terry allocated 25 hours per part, which were much higher than what was indicated in the plan learning plan Assignments and Deliverables (Appendix F, Table F1). When informing the amount of time, they would take to finish the entire course unit (LM-3), most of the participants (eight answers) chose eight weeks, as per the Learning Contract. Terry chose less than eight weeks and achieved her goal, while Nadia took more than eight weeks. The results (Q7.6, in Figure 25) confirmed that participants that allocated at least 12 hours weekly on each part (Carrie, James, Nadia, and Terry) were more successful in finishing the course unit within eight weeks. Some participants allocated the time wisely, in the parts that required more effort, planning their learning path ahead, thus triggering indicator q3_2 self-determined and capability-based learning.

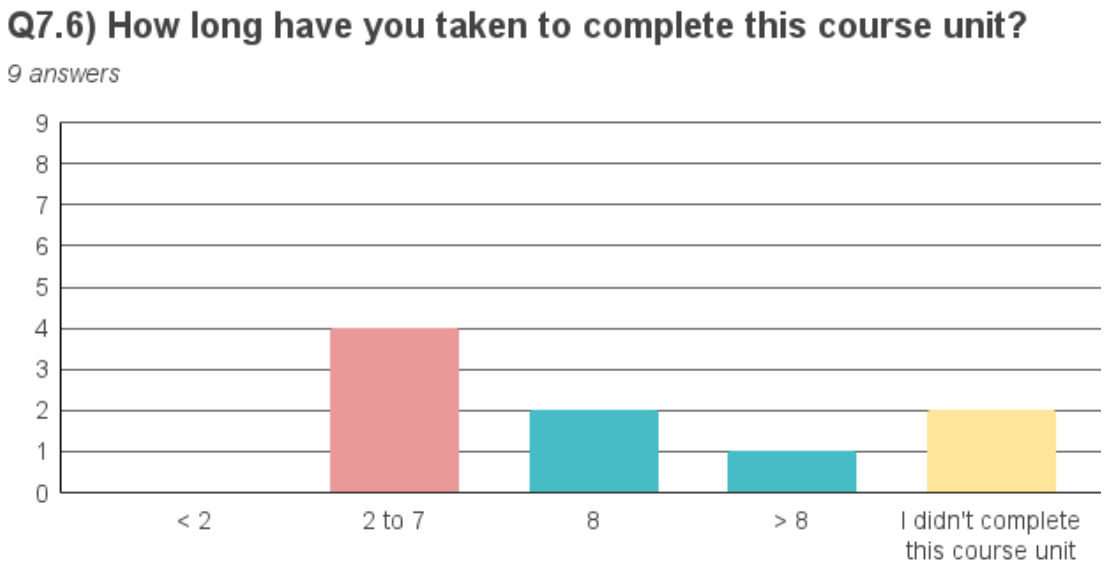


Figure 25 - time participants took to complete the trial course unit.

Results break-down – PLA in the quiz Q2_about Discover

The Personalised Learning Agreement (PLA) subcomponent had five (5) expected indicators: q1_1 contextualised, constructed learning, q2_2 double-loop learning, q2_3 non-linear learning, q3_1 learner-centred and q3_2 self-determined, capability-based learning. When responding to the quiz only four (4) participants recognised indicators q1_1 and q2_1 and few recognised the other expected indicators (Figure 26). Overall, participants could not recognise the contextualisation of the learning while completing the PLA and few related the deep learning and understanding (q2_1) with the self-reflective capabilities required during the PLA negotiation. More concerning was participants did not acknowledge the indicators of the research question RQ3, Personalised Learning, since they represented the main purpose of the negotiation of the PLA. In the quiz, only two participants recognised them: James and Nadia.

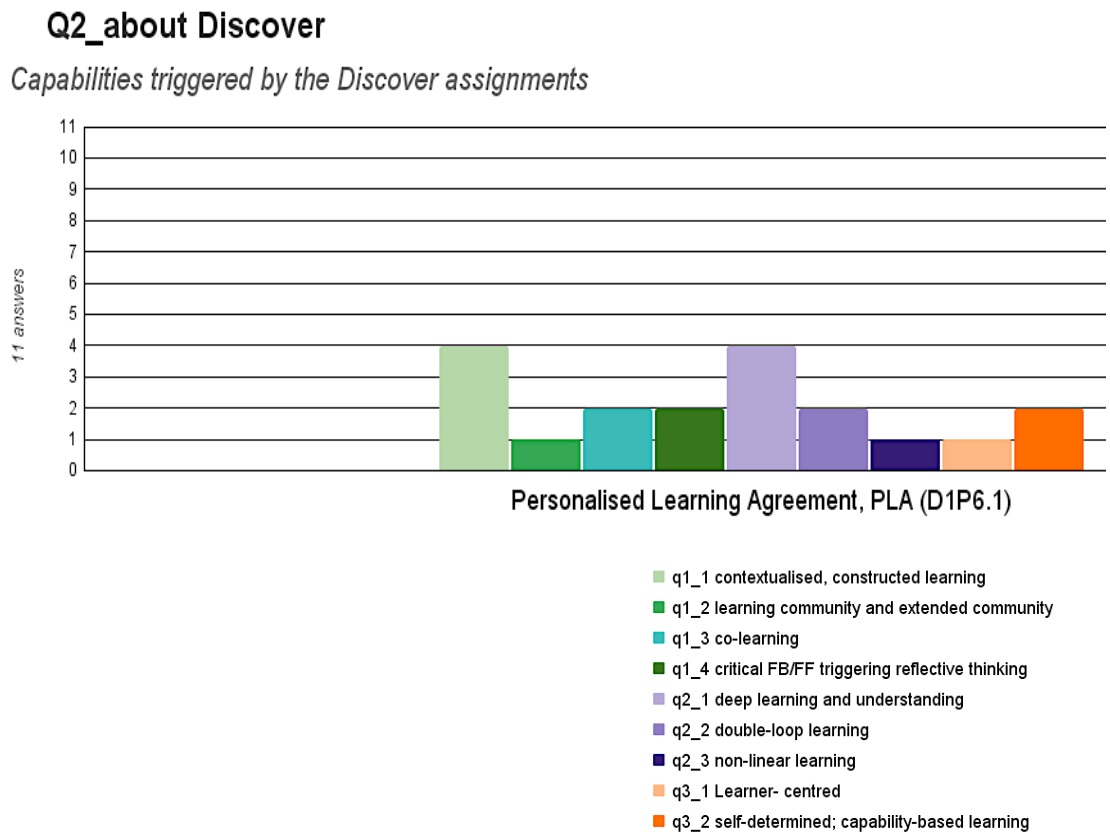


Figure 26 - participant's opinion on the PLA in the Q2_about the Discover.

5.3.3 Results from the Learning Experience (LE) component

This section presents the results from the charting stage of the framework analysis of the QAMs of the Learning Experience (LE) subcomponents: Online Learning Experience (o-LE), Collaborative Learning Experience (c-LE), Learning Assessment (La) and Learning Outcomes (Lo).

The aim was to understand if the QAMs triggered the indicators of the research questions, as expected, while participants completed the activities in the Define, Develop, Demonstrate and Deliver parts of the trial course unit. The procedure followed the parameters previously defined for the QAMs, considering the expected indicators as "MET" or "partially MET" when identified in the QAMs analysis, done by the researcher or by the participants' answers in the questionnaires and quizzes. In accordance with the analytical matrix Appendix H (Table H1), the Learning Experience (LE) component had one-hundred and sixteen (116) expected indicators. The QAMs in the Define-assignments part were mandatory for participants to complete, since they provided relevant information about the subcomponents. The QAMs in the Develop part followed the negotiation of the PLA, and participants were able to adapt the assignments to the specificities of their projects.

The Summary of the Analysis, QAMs (Appendix J, Table J3) demonstrated that participants could not recognise the expected indicators when responding to the quizzes *Q3_about Define* and *Q4_about Develop*. Still, the researcher identified the expected indicators when analysing the QAMs. Therefore, the Online Learning Experience (o-LE) and the Collaborative Learning Experience (c-LE) subcomponents contributed partially ("partially MET") to the Learning Experience component (LE).

When analysing the subcomponents Learning Assessment (La) and Learning Outcomes (Lo), all indicators "MET", and therefore the "Final analysis subcomponent - learning experience" considered that all indicators were "MET" in the QAMs, activating the research questions RQ1 Collaborative learning, RQ2 Prospective learning and RQ3 Personalised learning.

Next, the results breakdown will present the combined results obtained by the learning subcomponents Online Learning Experience (o-LE) and Collaborative Learning Experience (c-LE). The second part will focus on the results obtained in Learning Assessment (La) and Learning Outcomes (Lo) subcomponents.

The QAMs of the subcomponents Online Learning Experience (o-LE) and Collaborative Learning Experience (c-LE) related to the assignments in the Define and Develop parts of the trial course unit. They guided the development of the participants' projects, in accordance with the negotiation of the Personalised Learning Agreement (PLA). To complete the assignments, participants consulted the learning content and resorted to the learning platform, tools, and resources (o-LE) and relied on the learning community (c-LE).

While doing the assignments they needed to share the initial results in the discussion areas of the online platforms or in other applications, so other participants could provide feedback. Additionally, weekly meetings were scheduled with optional presence, in case participants had doubts or wanted to exchange their ideas. The assignments of the Define and Develop composed the deliverables (D8_1, D8_2, D8_3 and D8_4) participants submitted in the Demonstrate and Deliver parts, in accordance with the Learning Assessment (La) and Learning Outcomes (Lo) subcomponents.

During the Learning Experience (LE) few participants shared the progress of their works, and the ones who did, used different applications, sharing it with one or two other participants and with the PLM (personalised learning manager). This happened because participants joined the trial course unit in different periods and were divided in three groups. So, they interacted within those smaller groups. Another reason was the very nature of the projects that participants developed. Since they were negotiated in the Learning Discovery (LD) and Learning Contract (LC) components, some activities (QAMs) were not coherent with the project being developed and participants did not complete the exact activity as required but adapted them to suit their projects. Besides that, due to the nature of their

projects and the availability of the participants, some shared the projects only at the Demonstrate (D7P1.1_ Fashion collection, initial results) and Deliver (D8_1 to D8_4) parts.

These factors compromised the analysis procedures of some assignments in the Learning Experience (LE). So, to know if the subcomponents triggered the indicators, the analysis resorted to the assignments shared and the submissions of the *D7P2.1 Records of virtual diaries or journals*, the responses participants provided in the quizzes (Q3 to Q6), in the *D7P2.3_self-scoring and reflective journal*, in the *D8_6 Live presentation and delivery* and in the *Q7_course unit evaluation* about the subcomponents of the Learning Experience (LE).

5.3.3.1 Online and Collaborative Learning subcomponents (o-LE and c-LE)

The four (4) assignments in the Define part were expected to trigger indicators q1_1, q1_2 and q1_3. The six (6) assignments in the Develop part were expected to trigger all indicators of the research question (RQ1, RQ2, RQ3), since participants would require all the collaborative, prospective and personalised capabilities to develop their projects. Results indicated that the subcomponents online and collaborative learning (o-LE and c-LE) "MET" forty-two (42) expected indicators of research questions RQ2, Prospective Learning and RQ3, Personalised Learning, all triggered in the Develop part. There was no evidence of the expected indicators of the research question RQ1, Collaborative Learning in the Define part. Nevertheless, in the Develop part, twelve (12) indicators of the research question (RQ1) were "partially MET", since some participants collaborated within smaller groups.

All participants finished the assignments in Define and Develop, except for Erin, who was an observer of the trial course unit and Renée who did not develop or deliver her project. Still Renée was able to collaborate in Trello with Carrie and Joy and she created the empathy map, using Mural (app) to help define the target for her brand. Debbie and Nadia presented their projects in the Demonstrate part, without sharing the intermediate stages with the learning community. Similarly, Joy presented the final project in the Demonstrate part, focusing on the brand identity and target definition for a brand for women over fifty years old. Carol reunited the Define assignments in the *D3P1.3_Brand board* to present the identity of the sustainable brand she created, with the key collections and target definition. In Develop, she shared her ideas in the Moodle forum, but she was the only participant in that platform, so there was no interaction with other participants. James and Terry developed their projects together, using the Milanote tool, to define the brand, select second-hand clothes and develop a fashion photography production, with the first ideas for a short film. Carrie started in Trello with Joy and Renée, but later she chose to develop all the stages of her project in her blog, which she used for the Reflective

Learning Journal as well. The projects fully developed were presented in the subcomponents Learning Assessment and Learning Outcomes.

Results breakdown - Q3_about Define

The quiz verified participants' opinions about the capabilities triggered by the content, expressed by the indicators. It also collected their opinions about the assignments of the Define part, while completing the activities. The quiz received ten (10) answers about the content and nine (9) answers[82] about the assignments. In accordance with the parameters of QAMs the indicators would be considered "MET" if >=50%, "partially MET" if >=40% (>=4.4 answers) and "not MET" if <40% (<4.4 answers).

Results breakdown - Define_content

Six (6) participants recognised indicators of the research question RQ1, Collaborative Learning in three topics of the content[83] Indicators of the research question RQ2, Prospective Learning and RQ3, Personalised Learning were not recognised by participants, scoring very low (<50% of the answers). Although five participants mostly agreed that the content was easy to consult (Figure 27) they also considered that the way it was presented did not promote opportunities for "*shared creation, or moments that they could learn from each other*". This was relevant feedback to improve the way content should intertwine with the assignments.

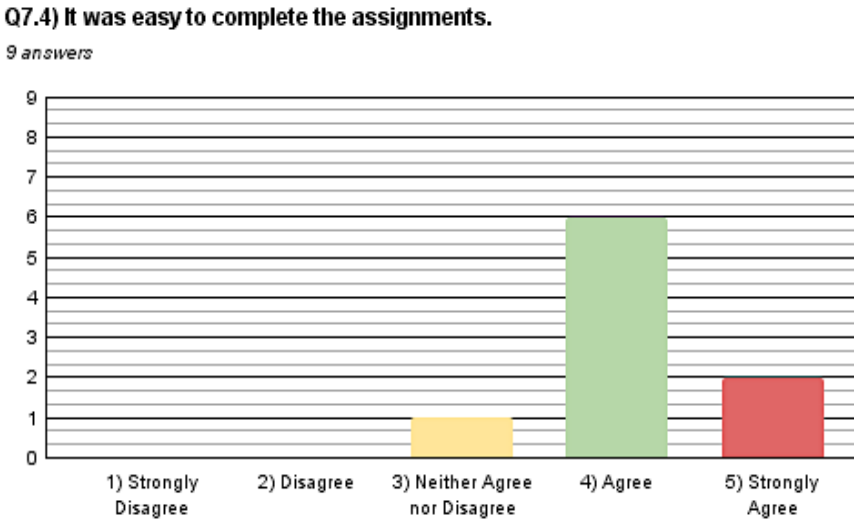


Figure 27 - Q7_evaluation form, results from question 4.

[82] One participant withdrew – Vicky.

[83] Expected indicator q1_3 in the content *Fashion Collections (D2P1.1)*, and unexpected indicator q1_2 in *The market (D2P1.3)*. Another unexpected indicator q2_2 was triggered in *The brand (D2P1.2)* by 5 participants.

Results breakdown - Define_assignments

Only two (2) expected indicators were "MET" (>50% of the answers), q1_1 and q1_3 and expected indicator q1_2 scored low. However, participants recognised indicators of RQ1, Collaborative Learning in two assignments (Appendix M, Figure M1): *Brand identity definition* (D3P1.1) and *Brand board* (D3P1.3). This confirmed evidence from the observation, since most participants completed the assignments. Some participants also recognised the unexpected indicators q2_2 in the assignments *Brand's key collections (D3P1.2)* and *Brand board (D3P1.3)*.

Results breakdown - Q4_about Develop

The results of the quiz demonstrated that from the fifty-four (54) expected indicators, the indicator, q1_2, was "MET" (five answers) and the indicator q2_1 was "partially MET" (four answers) in the assignment *Fashion trends sources (D4P1.1)*. Indicators of the RQ3, Personalised Learning scored "zero" (or received one answer) and few participants recognised indicators of RQ2, Prospective Learning. Since participants adapted the assignments to the specificities of their projects, they did not recognise the indicators presented. Furthermore, the Develop part was the longest of the learning experience and required participants to work more independently to plan and structure their fashion projects to be presented and delivered in the next parts (Appendix M, Figure M2).

5.3.3.2 Learning Assessment and Learning Outcomes subcomponents (La, Lo)

The subcomponents related, respectively, to the Demonstrate and Deliver parts of the trial course unit. The QAMs in Demonstrate required participants to present the initial results of the fashion collection (in a live meeting), submit the records of the reflective learning journal (RLJ) and complete the self-scoring (SC) questionnaire. Working individual/collaborative, internal/external feedback levels, the goal was to promote opportunities of peer assessment and self-assessment, to incentivize a critical reflection about their work and about the work of the colleagues. In the Deliver part participants submitted the Assessment Deliverables (D8_1 to D8_4 and D8_6)[84] with the final versions of their projects as well as any other outputs or results, Learning Outcomes (Lo) negotiated in the PLA. Since the learning deliverables represented the accomplishment of the previous QAMs, the analysis considered them as the result of the learning experience component that confirmed and reinforced the previous parts of the

[84] The deliverable *D8_5 self-assessment - PLA calibration* aimed to help participants with the negotiation of the Personalised Learning Agreement (PLA), before the final delivery. However, it was not considered in the analysis, since no participant felt the need to adjust the initial negotiation of the PLA.

trial course unit and therefore, they expected to trigger all the indicators of the research questions (RQ1, RQ2, RQ3).

The learning assessment (La) subcomponent respected the formative assessment rubrics (FARs) previously defined and resorted to the QAMs of the Demonstrate part to compose the summative part: the % grade negotiated for the Learning Outcomes (Lo), in accordance with the Weighting system chosen by the participant in the PLA, the % grade of the self-reflective assignments and the % grade of the questionnaire self-scoring.

Overall, the results demonstrated that five (5) participants self-scored the accomplishments of the assignments coherently with what they had negotiated in the PLA, triggering (MET) expected indicators q2_2 double-loop learning, q3_1 learner centred and q3_2 self-determined, capability-based learning, this way contributing to the subcomponent Learning Assessment (La). Some participants (Joy and Renée) were not able to complete all the assignments or delivered results below their expectations. Still, they were aware of the learning outcomes they had established for themselves at the beginning and the level of achievement they fulfilled at the end of the course unit. Carrie self-scored higher than she had initially negotiated, while James, Nadia, and Terry self-scored as they expected (Appendix M, Table M2).

Results break-down - D7P1.1_Fashion Collection, initial results

As part of the Demonstrate part of the course unit and the La subcomponent, participants uploaded the files (or shared links) of the initial results of their projects and joined the live presentation[85] (D8_6) to provide and receive feedback from the learning community (Figure 28 and Appendix M, Figure M3).

The initial results of the fashion projects amalgamated the assignments participants developed the Define and Develop parts and expected to trigger five (5) indicators of the RQ1, RQ2 and RQ3 (q1_1, q1_2, q2_1, q2_3, q3_2).

Seven (7) participants submitted their initial projects and overall self-scored "Very Good" to "Excellent", meeting the expectations negotiated in the PLA. Joy self-scored 'Sufficient', indicating that the initial results did not meet her initial expectations. The presentation of the projects took 20 minutes followed by 20 minutes of discussion based on the topics of the projects but giving space to surpass them uncovering new issues. The live presentation triggered the indicators of the research questions (RQ1, Collaborative Learning, RQ2, Prospective Learning and RQ3, Personalised Learning). The completion of

[85] January 16th, 2021, recorded and published in the course unit YouTube channel.

the *D7P1.1_Fashion collection, initial results*, which resulted in the submissions of the deliverables (D8_1 to D8_4), triggered all the expected indicators and the live presentation (D8_6) helped to trigger indicators that were not expected in the assignment, contributing to verify the Learning Experience component.

The projects were contextualised, brought real life situations closer to their learning experience (q1_1 contextualised, constructed learning) and were the result of the alignment that participants did between their needs and wishes (James and Terry), their learning objectives with the goals defined in the course unit (q3_1 Learner-centred), negotiating it and uncovering new learning paths using their experience to produce something different from what they did professionally (q3_2 self-determined, capability-based learning). Some projects evidenced questioning and high-level questions (Carrie's and Carol's) making participants to challenge their own assumptions, extrapolate the content of the course unit, leave their comfort zone (q2_1deep learning and understanding, q2_2 double-loop learning, q2_3 non-linear learning).

Figure 28 - examples of participant's projects.

Perhaps the indicators that were less evident were q1_2 learning community and extended community and q1_4 critical FB/FF triggering reflective thinking, which were evidenced in the live presentation where participants had the opportunity to meet, share ideas and see each other's work. For this reason, the indicator q1_3 co-learning was only evident in the development of James and Terry's work, who collaborated in Milanote.

By presenting their projects participants were able to share their perspectives to the learning community and the external community (q1_2 learning community and extended community) and receive live feedback on the topics they had brought into discussion, triggering other topics equally relevant (q1_3 co-learning). Through critical feedback (q1_4 critical FB/FF triggering reflective thinking) participants were able to reflect about the fashion sector in their regions and about their role as fashion professionals and future paths in their career. The high level of information presented by the projects, namely by Carol's and Nadia's, triggered indicators q2_1 deep learning and understanding, q2_2 double-loop learning and q2_3 non-linear learning, as demonstrated by the discussion that followed the presentations. On the other hand, James's presentation evidenced indicators q3_1 Learner-centred and q3_2 self-determined, capability-based learning since he resorted to the content of the course unit to support the creation of a fashion film for the portfolio of his fashion production company.

Results breakdown - D7P1.2_Final feedback / feedforward

This assignment incentivised participants to provide critical and constructive feedback to promote individual self-assessment and self-reflection capabilities, evidence of q1_4 critical FB/FF triggering reflective thinking (Figure 29). Five (5) participants evaluated the projects in relation to the assignments and providing suggestions for improvements.

- Debbie (fashion design master student) received feedback from Renée (fashion designer).
- Carrie received feedback from Nadia (fashion design teacher) and Debbie.
- James and Terry (fashion enthusiasts / students) provided feedback for each other.

Figure 29 - example of the D7P1.2_Final feedback / feedforward

Results breakdown - D7P2.1_Records of virtual diaries or journals

As an assessment tool, the assignment was part of the deliverables (D8.5, Self-assessment) and required participants to upload the records of their Reflective Learning Journals (RLJ), reporting and reflecting on their learning experience (Appendix M, Figure M5). The transcribed evidence of the individual journals confronted six (6) expected indicators: q1_1, q1_3, q1_4, q2_2, q3_1 and q3_2 (Appendix M, Table M1). The results demonstrated that all indicators were "MET" by the RLJ assignment. Six (6) participants submitted their RLJ, reflecting on the online model (Erin) providing feedback on the course unit (Joy), reflecting on their career paths, the difficulties, and aspirations (Renée, as in Appendix M, Figure M4), or registering their learning experience (Carrie, James, and Terry).

Carrie registered the development of her assignments, from the identification of the megatrend to the initial ideas for a capsule collection (Figure 30). She also expressed her difficulties and informed how she overcame them, illustrating her self-determined capability (q3_2). Her first entry (December 12th) answered the topics of discussion proposed in the complementary assignment *D1P5.2_Future in/for Fashion.* She presented learner-directed questions, self-questioning her practice as a fashion professional. Although she consulted the requirements of the assignment, she was able to expand the content to relate and contribute to her professional experience, triggering expected indicator q3_2. Carrie's learning and creative processes evidenced indicators of the research question RQ3, Personalised Learning. The highlighted excerpts of James´ comments (Appendix M, Figure M5) triggered indicator q3_1 learner-centred, as he reviewed the assignments, putting himself, his brands, and his project with Terry in the centre of the decisions.

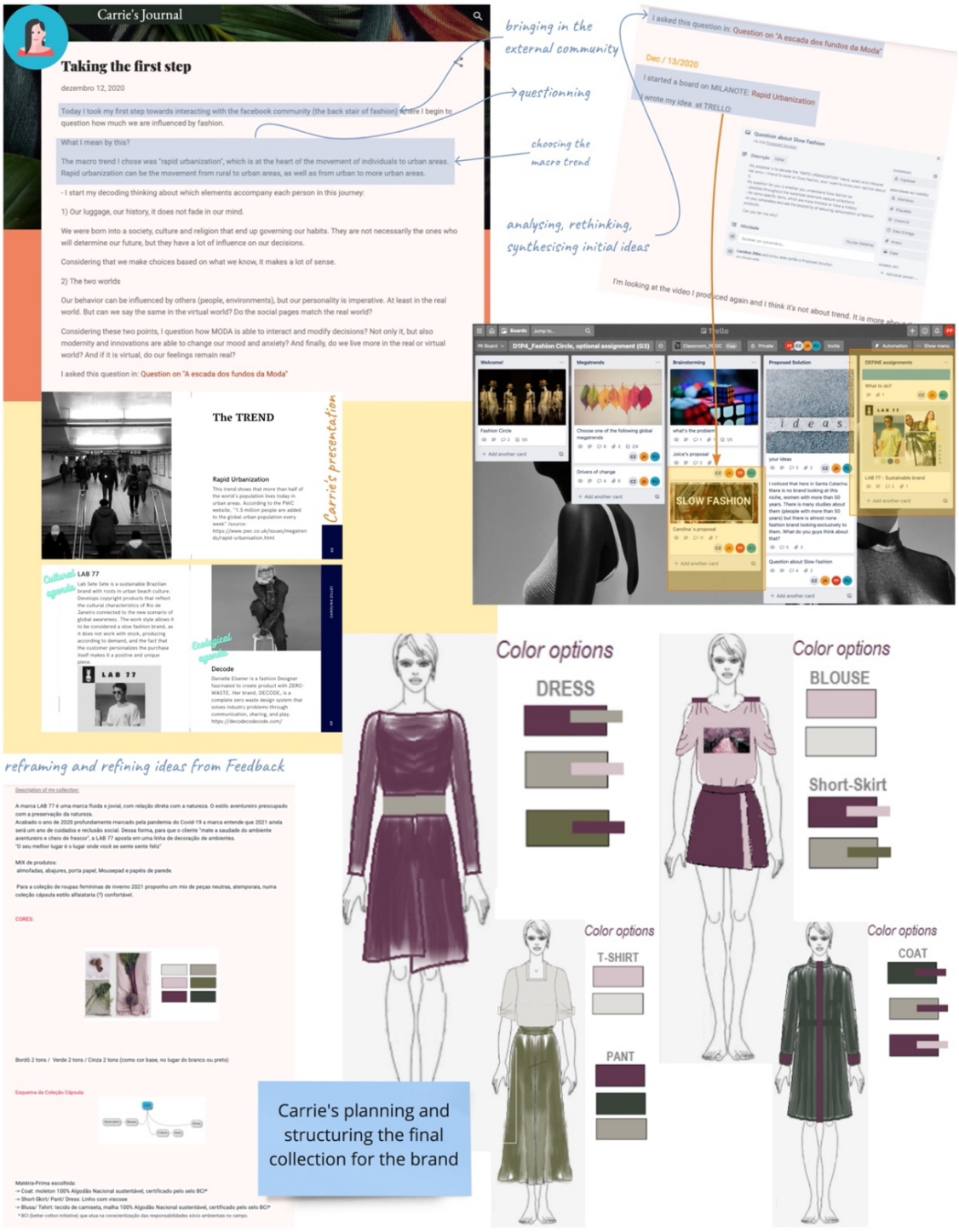


Figure 30 - Carrie's project development registered in the reflective learning journal.

Results breakdown - D7P2.3_self-scoring

The questionnaire was part of the Learning Assessment (La) subcomponent and required participants to self-assess the deliverables, Learning Outcomes (Lo), indicating a percentage grade and the level of quality achieved. The aim of the questionnaire was to prompt participants to critically reflect about their learning processes, and on the level of accomplishment of the results in relation to the PLA negotiation, thus triggering indicators q2_2 double-loop learning, q3_1 learner-centred and q3_2 self-determined, capability-based learning. Furthermore, it revealed the assignments participants focused more or were more interested in completing to fulfil the outcomes as negotiated in the PLA.

Table M2 (Appendix M) summarises the results obtained in the self-scoring of seven (7) assignments (SC-1 to SC-7) provided by eight (8) participants (except Erin) and related to the following deliverables: *D8_1 Trend Study*, *D8_2 Market and target study*, *D8_3 Brand study* and *D8_4 Fashion design project*. Overall participants self-scored "Good" (SC-2 to SC-7) in the accomplishment of six (6) assignments and "Very Good" for the accomplishment of the assignment D4P1.1. Joy and Renée[86] (25% of the participants) self-scored the lowest, not meeting their initial expectations.

Results breakdown - Q5_about Demonstrate and Q6_about Deliver

The quiz Q5_about Demonstrate (Appendix M, Figure M6), verified participants opinions about the capabilities triggered (expressed by all the research questions indicators) by three QAMs of the Learning Assessment Component (La): the assignments *D7P1.1_Fashion collection, initial results*, *D7P2.1_Reflective Learning Journal - records*, and the questionnaire *D7P2.3_self-scoring.* The quiz Q6_about Deliver (Figure 31) required participants to inform the level of satisfaction they achieved, reflecting on the results presented in comparison to the outcomes negotiated in the PLA. The degree of satisfaction was a confirmation of the impact of the learning experience helping participants accomplish their goals.

[86] Renée was the only participant that could not deliver a project due to personal difficulties.

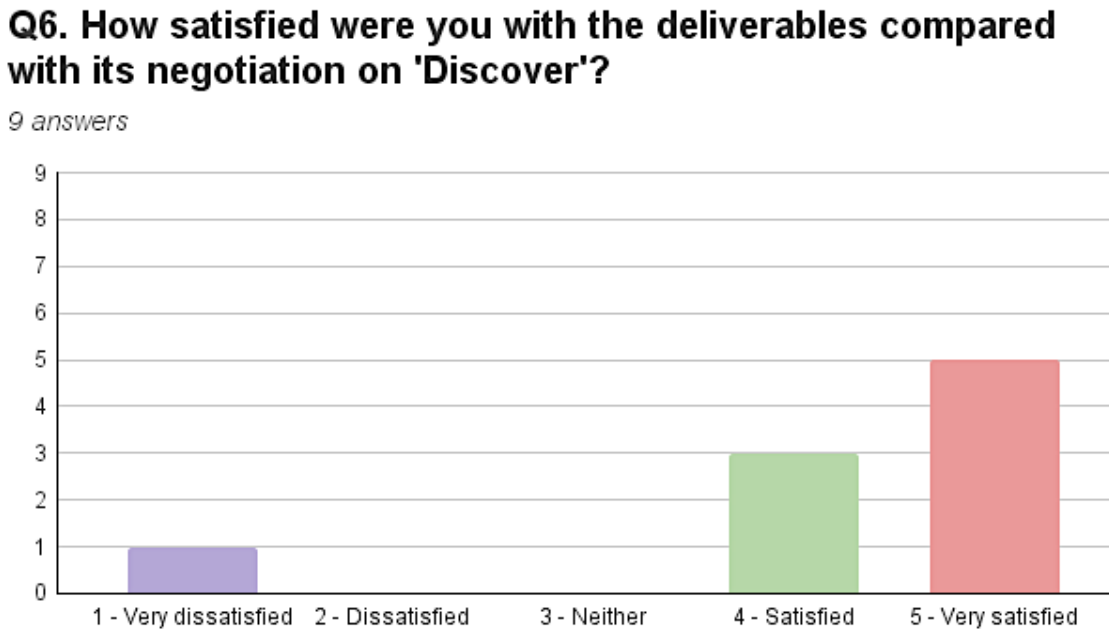


Figure 31 - quiz Q6, results: satisfaction with the learning deliverables.

Both quizzes obtained nine (9) answers. So, results were "MET" when obtained >=50% of the answers (>=4.5 answers). The results of the quiz Q5_about Demonstrate indicated that most participants recognised (MET) the expected indicator q2_2 double loop learning, representing the higher score this indicator received during the entire trial course unit. Similarly, four (4) participants recognised the expected indicator q2_1 deep learning and understanding. Some participants (three answers) recognised the expected indicator q1_2 learning community and extended community, and q2_3 nonlinear learning - those were "partially MET". Overall, participants were "Satisfied" or "Very Satisfied" with the results of the learning experience, as confirmed by their comments and suggestions.

5.4 Summary of the learning components analysis

The analysis of the results in the previous section (5.3) generated three (3) analytical matrices (Appendix J, Tables 21J, 22J and 23J) of the learning subcomponents (learner-centred, learning community, learning contract, online learning experience, collaborative learning experience, learning outcomes and learning assessment). These analytical matrices summarised the data obtained by the QAMs confronted with the indicators, and informed if each Learning Component of the model COL4FASHION had triggered the research questions (RQ1, RQ2, RQ3).

This section relates to the mapping stage of the framework analysis and includes the contributions of the questionnaire *Q7_course unit evaluation* and the Focus Group and had two purposes: first to verify the results of the previous analysis in relation to the research questions (RQ1, RQ2, RQ3); second to create a higher-level analytical matrix (HLAM) resorting to the contributions from these two instruments to confirm the analysis of the learning components: the Learning Discovery, the Learning Contract and the Learning Experience.

Therefore, the section was organised in three parts.

- Part 1 presents the overall opinion of the participants in relation to the trial course unit collected by the *Q7_course unit evaluation*.
- Part 2 presents evidence of the research questions (RQ1, RQ2, RQ3) recognised by the participants in the questionnaire *Q7_course unit evaluation* and in the Focus Group.
- Part 3 focuses on the Learning Components (Learning Discovery, Learning Contract and Learning Experience) and introduces the higher-level analytical matrix (HLAM) supported by the results of the *Q7_course unit evaluation* and Focus Group.

The questionnaire *Q7_course unit evaluation* was designed to collect participants' opinions about the five (5) parts of the trial course unit and to verify the information previously collected about the Learning Components. Applied at the end of the course unit, it had twenty (20) questions. All nine participants answered the questionnaire and left comments or suggestions.

The Focus group had two parts, with five activities participants engaged with, commenting about the research questions, its indicators, and the Learning Components. From the nine (9) participants of the course unit, five (5) joined the meeting, roughly representing >50% of the total participants.

Results breakdown – opinion of the participants in relation to the trial course unit (Q7_course unit evaluation)

Participants were “Very Satisfied” (5 answers) and “Satisfied” (2 answers) with the learning experience (question Q7.7 in Figure 32) and two participants, Carrie, and Joy, answered “Neither satisfied nor dissatisfied”. These participants identified the language, English, as their main difficulty, as well as Debbie. Carrie also considered that the time to complete the course unit was short. They presented suggestions and stated the difficulties encountered (open question, Q7.8).

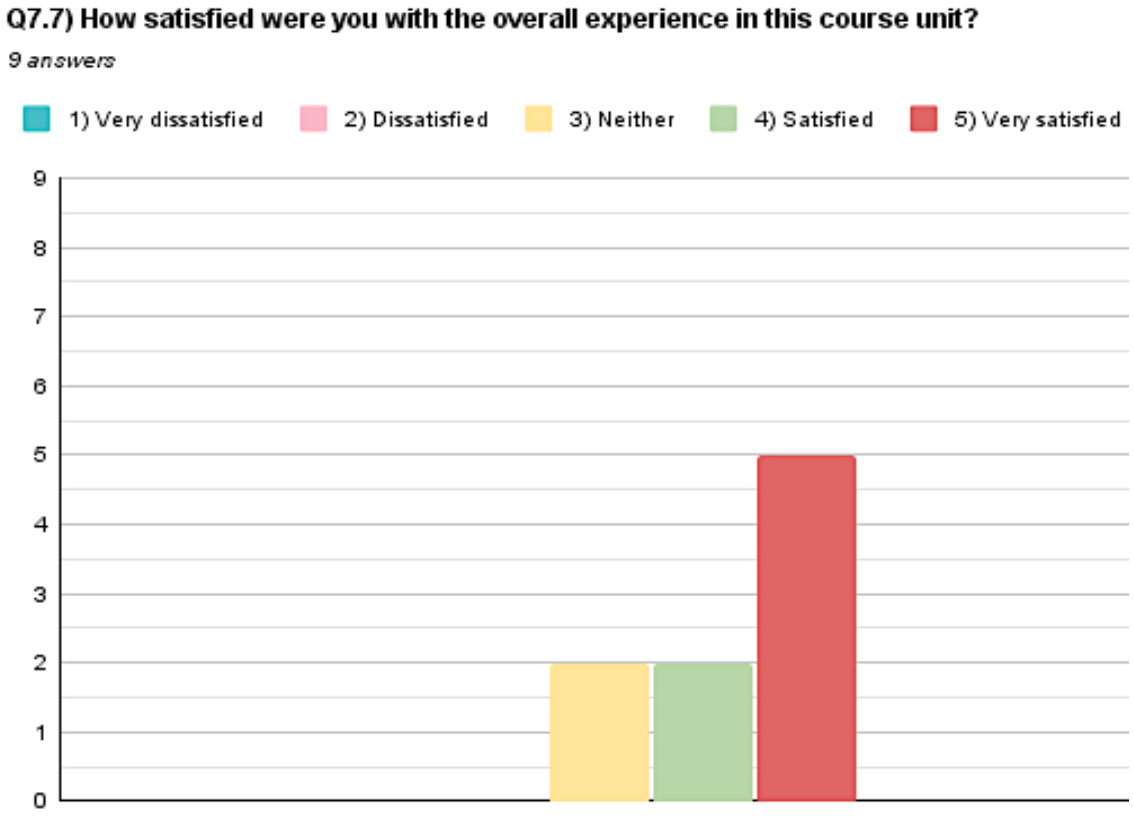


Figure 32 - Q7_evaluation form, results from question 7.

Results breakdown - participants identifying the research questions in the trial course unit (Q7_course unit evaluation)

Questions (Q7.10, Q7.11, Q7.12, Q7.18, Q.19 and Q7.20) required participants to recognise the capabilities triggered in the course unit related to the indicators of the research questions RQ1, Collaborative Learning, RQ2, Prospective Learning and RQ3, Personalised Learning. The results confronted with participants' opinion in the Focus Group to contradict or reinforce the analysis of the results.

RQ1 Collaborative Learning (Appendix N, questions Q7.10 Figure N1 and Q7.20 Figure N4)

- Indicators q1_1 contextualised, constructed learning (5 answers) q1_3 co-learning (8 answers) and q1_4 critical FB/FF triggering reflective thinking (6 answers).
- Six (6) participants “Strongly Agreed” that Collaborative online learning models can support new ways of learning fashion design.

- Focus group - four (4) answers recognised indicator q1_3, as *reflective discussions in pairs/groups* and *shared creation/creativity* "Almost always" occurring in the learning experience. Five (5) answers recognised indicator q1_2 learning community and extended community, *impacting individual or group learning experience*.

Therefore, participant's responses in the questionnaire *Q7_course unit evaluation* and in the Focus Group reinforced the indicators of the research question RQ1, Collaborative Learning, confirming the subcomponent learning community, thus contributing to the Learning Discovery component.

RQ2 Prospective Learning

- Indicator q2_3, recognised by 4 participants, non-linear learning through questioning.
- Focus group (part 1, Activity 2) most participants "Agreed" that the course unit promoted indicators q2_1 deep learning and understanding (8 answers) and q2_2 double-loop learning changing the mindset (5 answers). The results of the Focus Group demonstrated that few participants recognised indicators of RQ2, Prospective Learning occurring in the learning experience.

RQ3 Personalised Learning question Q7.12 (Appendix N, Figure N2)

- Most participants "Agreed" (five answers) that the trial course unit was learner-centred and promoted self-development, valued previous competences, and applied them into new challenges.
- Participants "Strongly Agreed" (five answers) that the trial course unit promoted autonomous learning, recognising the indicators q3_1 and q3_2
- Focus group (Activity 1) - three answers recognised indicator q3_1 (self-development, lifelong learning) "Often" occurring in the learning experience and indicator q3_2 (application previously acquired competencies into new challenges - prospective thinking) "Almost always" occurring in the learning experience.

The option "*This course unit does not promote a personalised learning experience*" was a confirmation to participants previous responses and purposefully presented as an opposite statement. Only Erin "Agreed" with the statement, confirming her previous answers related to indicator q3_2.

Results breakdown - participants identifying the research question for the fashion professional (Q7_course unit evaluation)

The questions (Q7.17, Q7.18 and Q7.19) aimed to understand if participants recognised the research questions (RQ1, RQ2, RQ3) in the overall development of their projects, in the fashion design sector (Q7.19, as in Figure 33) and the professional reality of fashion designers (Q7.18).

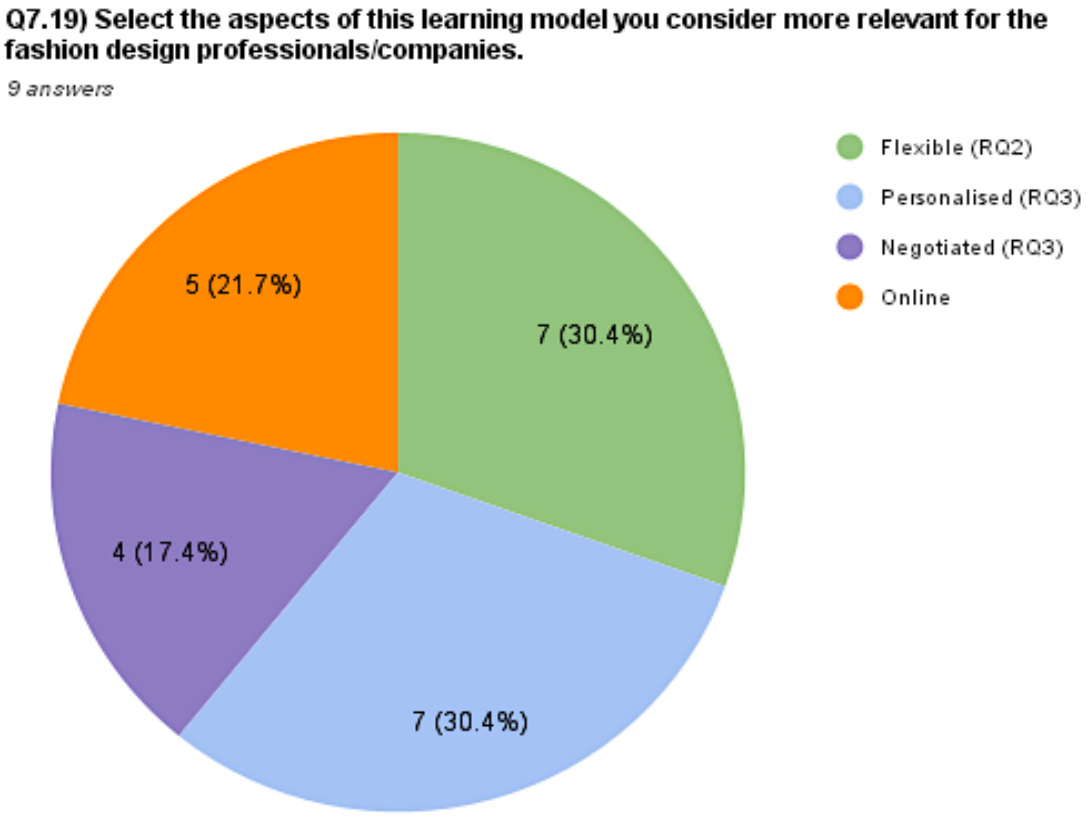


Figure 33 - Q7_evaluation form, results from question 19.

- Most participants recognised Question Q7.17 (Appendix N, Figure N3) *research and interpretation of the information* (RQ1 and RQ2), *communication and collaboration*, *creative/imaginative thinking* (RQ1), *anticipative thinking, flexible learning* (RQ2) and *personalised learning* (RQ3) as aspects that contributed for translating fashion information (trends, brand, market) into elements for the fashion collection.
- Focus Group (Activity 5, in Appendix N, Table N1) presented eight (8) statements associated with the research questions (RQ1, RQ2, RQ3), confirming participants previous comments:
    1. The outcomes of the online, collaborative, personalised learning can be rapidly implemented to the professional settings by the learner.
    2. Certification (from online learning experiences) is imperative for professionals/ companies.
    3. In this learning experience, the learning community promoted different learning paths that could be incorporated into my individual learning.
    4. Online, collaborative, personalised learning can produce more capable professionals.

5. The learning experience allowed to try different learning pathways.
6. This was a personalised learning experience.
7. Online, collaborative, personalised learning can promote a more meaningful and contextualized learning experience for the fashion design sector.
8. To be able to learn online, collaboratively, learners need to have a specific profile.

The results (Q7.18, Figure 34) indicated that all nine (9) participants considered "Extremely Important" for the fashion design professionals the capabilities related to RQ1 Collaborative Learning. Similarly, *Autonomous Thinking, Reflective thinking* and *Anticipative thinking* scored high, confirming RQ2, Prospective Learning and RQ3, Personalised Learning. However, they did not consider "*Non-linear thinking, embrace uncertainty*" (RQ2) relevant for fashion design professionals. All participants considered the Collaboration (RQ1) the most relevant aspect of the learning model for the fashion design professionals/companies, confirming their previous answers. Similarly, seven (7) participants considered flexible (RQ2) and personalised learning (RQ3) as important aspects and five (5) indicated relevant the online model of learning. However, only Carol, Debbie, James, and Joy identified the negotiated learning (RQ3) as a relevant aspect.

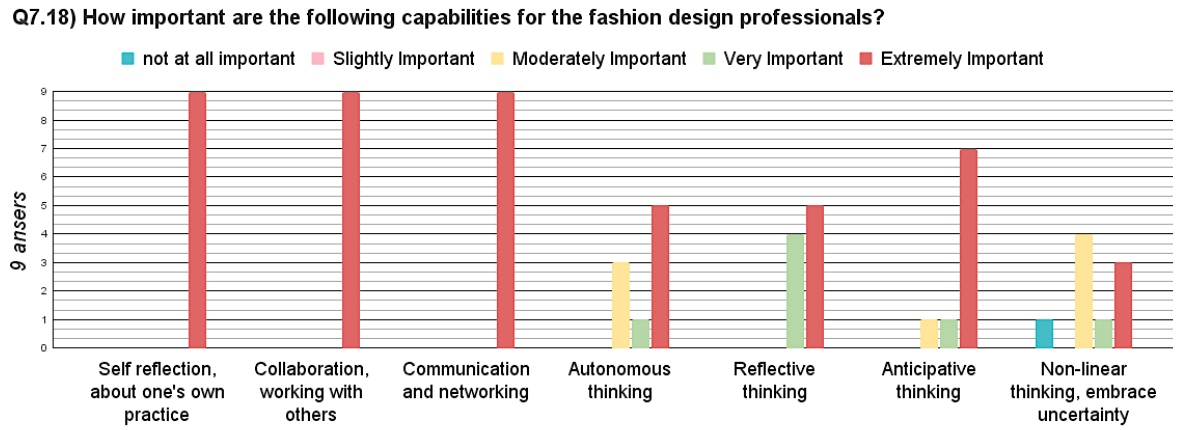


Figure 34 - Q7_evaluation form, results from question 18.

Results breakdown – participant's final remarks during the Focus Group

Participant's comments (Appendix N, Table N2) in the Focus Group (part 2) complemented and confirmed their opinions about the relevance of the model of learning adopted in the trial course unit for the fashion design professionals.

They commented that more and more the fashion sector requires fashion professionals educated as designers primarily, but current systems of teaching in fashion design are not educating students with extensive knowledge of design, before branching out into the fashion industry. In general, fashion designers are influenced or have preference for a specific area when they start studying without understanding the whole parameters of the sector. Therefore, participants considered that the online platform and the learning model can adjust and update the knowledge already acquired by professionals, improving it, which is difficult to do within the job market or in traditional academic settings. They also considered that, as professionals had to prepare themselves suddenly, to adjust to the new changes in the market, the online and collaborative work can help individual learning, personalising the learning while working in groups. About the learning model (COL4FASHION), participants considered it can promote greater alignment between the different learners, creating connections and involvements that can continue beyond the learning platform and move to the job market. Finally, they considered that the relation between all parts (of the trial course unit) promoted flexible learning and more autonomy, especially since each participant was able to surpass the content, preparing specific projects. Their comments were aligned with their responses in the questionnaire Q7 (question Q7.20, Appendix N, Figure N4), in which most of the participants (seven answers) "Strongly Agreed" that the *learning model adopted in this course unit would be quickly implemented and absorbed by fashion companies at a fair price*.

5.4.1 Confronting the learning components with the research questions

In this section the analysis "hidden" the research question indicators and focused on the analysis of the Learning Components against the higher-level research question (RQ1, RQ2, RQ3). The goal was to confirm the higher-level analytical matrix (HLAM), resorting to the contributions of the questionnaire *Q7_course unit evaluation* (questions Q7.4, Q7.9, Q7.13, Q7.14, Q7.15, Q7.16, and Q7.20) and the Focus Group.

Table 10 Analysis of the Higher-level analytical matrix (HLAM)

Learning Components	RQ1 Collaborative Learning	RQ2 Prospective Learning	RQ3 Personalised Learning
Learning Discovery	EXPECTED, and MET	EXPECTED, and MET	EXPECTED, and MET
Learning Contract (*Personalised Learning Agreement, PLA*)	EXPECTED, partially MET not EXPECTED, but MET	EXPECTED, partially MET	EXPECTED, partially MET
Learning Experience	EXPECTED, and MET	EXPECTED, and MET	EXPECTED, and MET

The Learning Discovery component

The component was confirmed in the questionnaire Q7 (question Q7.9, options 2, 5 and 7) and most participants considered "*The introductory part (Discover)"* an "Important" (five answers) characteristic and "*The interactions with the internal community"* a "Very Important" (six answers) characteristic of the trial course unit. Similarly, participants (five answers) considered "Very Important" the Define assignments*: 'About the brand' and 'About the market',* related to indicator q1_1, thus helping to confirm the Learning Discovery component.

The Learning Contract component

The results of the analysis (Table 10) demonstrated that although there was evidence of the PLA negotiation triggering the research questions (RQ1, RQ2, RQ3) participants did not recognise them during the trial course unit. Still, in the questionnaire Q7 (question Q7.9 option 3) most participants (seven answers) considered it a "Very Important" characteristic of the trial course unit. Similarly, most participants (eight answers, in questions Q7.13 and Q7.14) considered that *it "ensured a truly negotiated learning experience"* (Appendix Q, Figure Q1) and that "*it helped assume the uncertainty of learning experience*" (six answers). Most importantly, all participants considered that the PLA

accommodated the learning components in accordance with their learning interests (question Q7.14). Participant's responses in the *Q7_course unit evaluation* informed that the PLA was a relevant tool for the negotiation and personalisation, confirming the research questions (RQ1, RQ2, RQ3).

The Learning Experience component

Most of the participants (seven answers) considered the feedback received by the external community and by their peers "Very Important". This result verified the RQ1, Collaborative Learning and contributed to confirm the Learning Experience (LE) component.

Overall, most participants (>=50% of nine answers) considered the characteristics related to the online learning experience (o-LE) subcomponent as "Important" and "Very Important" such as:

- the time frame suggested for each part (Q7.9, option 8).
- the flexibility to move forward and backward along the five parts (Q7.9, option 9).
- the opportunity to finish the course unit before the time frame initially defined (Q7.9, option 10).
- having all the content available at once (Q7.9, option 4).
- the organisation of the course unit in five parts and eight weeks (Q7.9 option 1).

When evaluating the learning assessment (La) subcomponent, participants considered the *self-reflection assignments* and *the self-assessment opportunity - self scoring* "Very Important" characteristics (Q7.15 in Appendix Q, Figure Q2). Complementarily, participants recognised different aspects contributing to the learning assessment (Appendix Q, Figure Q3). Still, some participants (Carrie, Debbie, Erin, and Renée) did not recognise the relevance of these instruments for the learning assessment process. The *possibility to improve the Deliverables with the feedback received and negotiate the Deliverables - weighting* (Q7.9, options 13 and 16) were "Very Important" aspects of the Learning Outcome (Lo) in the opinion of the participants.

6. Discussion

This chapter discusses the model collaborative online learning for fashion design (COL4FASHION) and its five learning principles (FDLP) supported by the theoretical framework of the Literature Review and the results obtained from the testing of the fashion design online course (FDOC). The aim was to review and discuss the concepts and ideas brought by the findings, in connection with the theoretical framework, that could respond to the research questions.

The first section resorted to the higher-level analytical matrix, HLAM (Table 10) to discuss how the results obtained from the research prototype (trial course unit) answered the research questions. In the second section, the discussion focused on the model COL4FASHION, and the fashion design learning principles. It finalises considering the limitations and improvements of the initial model COL4FASHION, as well as the contributions for the fashion design education.

6.1 Research questions, discussion

As presented in the Chapter 5, the high-level matrix (HLAM) condensates the results of the learning components of the model, based on the results obtained from the trial course unit. The learning components and subcomponents, analysed in Chapter 5, helped to inform this section, and the discussion of the results, summarised in the HLAM (Table 10), responding to the three research questions (RQ).

6.1.1 Research question 1 collaborative learning (RQ1)

Is this model compatible with the current and future demands and socioeconomic contexts that influence the current systems of learning in fashion design?

The model was compatible with current and future demands and socioeconomic contexts of the fashion design sector, since it demonstrated evidence of collaborative and contextualised learning, which was especially important during the Learning Discovery and the Learning Experience component and subcomponents (Table 10).

To build collaborative and contextualised learning meant to organise the learning components of the model to allow learners to learn from each other, as much as from the content or the provided resources. Open to contextualised, constructed learning (with the support of the learning community), the model allowed real-life situations to emerge at the learning discovery, by prioritising the learner's expectations

and needs, then promoting a negotiated and flexible learning experience that accommodated different contexts and enriched different outcomes, and that also promoted prospective learning (RQ2)

6.1.2 Research question 2 prospective learning (RQ2)

Will the model promote anticipative knowledge in fashion design, with high-quality standards at acceptable costs, contributing to diminish the gap between the fashion academy and fashion professional sectors?

The model promoted anticipative knowledge in fashion design, which was especially relevant in the Learning Experience component (Table 10). By implementing flexible learning components, the model promoted non-linear learning opportunities, supported by anticipative thinking, emergent thinking, and decision-making attitude (agency) which also reflected on promoting a personalised learning experience. It would not be possible to promote prospective learning if learners did not challenge their own theories, values and assumptions (double loop learning). Similarly, it would not be possible to embrace uncertainty without promoting space for questioning (inquiry-based learning), for thinking ahead, for questioning "what it is" and proposing "what it can be". So, in the model, instead of defining the learning components to meet the requirements of the current job market, limited by expected competencies, the model's components opened opportunities to envision future professional settings, branching out the initial contents, outcomes, and assessments. In this sense, the model not only diminished the gap between the academy and the professional sector, but anticipated it, producing learners with a prospective perspective that can quickly adapt to the future needs of the sector.

6.1.3 Research question 3 personalised learning (RQ3)

Will this model satisfy the personalised learning needs and specificities of the different professionals' groups and companies?

The model satisfied different needs and motivations of different fashion professionals and students and demonstrated evidence of personalised learning in the Learning Discovery and Learning Experience components (Table 10) and partially in the Learning Contract component. Since the learning components presented negotiable fields, it allowed the model to be flexible to accommodate different expectations and needs, diverse and meaningful learning pathways and yet remaining truthful to its learning principles (FDLP).

The model was not (pedagogically) focused on content acquisition, through restrictive learning outcomes, set to be assessed by specific methods and instruments. Instead, it allowed meaningful and

personalised outcomes to surface without compromising the institutional goals. The model presented mechanisms to accommodate individual learning styles and personalise the learning experience through individual meetings and the negotiation of the learning outcomes and other learning components, such as the learning assessment (and the deliverables). Learners needed first to reflect on previously gained competencies (through self-reflection and self-diagnosis assignments) and identify what they needed or wanted to achieve from the learning experience, thus taking responsibility for their learning (self-determined learning). This is how personalised learning creates autonomous learners, capable of continuing learning after the learning experience, taking advantage of each opportunity to gain, update and apply knowledge and skills into new challenges. Once learners negotiated and defined the learning path, it opened the opportunity to update and extrapolate initial contents and expected outcomes, constructing the learning experience, and bringing it closer to professional settings or professional aspirations.

However, personalised learning is to be built together in a learning community, working collaboratively, providing constructive feedback, and sharing different perspectives and resources to achieve outcomes aligned with the market. This was the greater challenge of the model when testing it in the trial course unit. Still, smaller communities helped learners to question their mindset by taking into consideration and reflection on the points of views of others. In this case, the model responded to personalised learning (RQ3) because it activated collaborative learning as well (RQ1).

It was not possible to promote personalised learning without first knowing the user/learner (learner-centred) and create a learning experience aligned with learners' professional life, interests, and expectations. Complementary, the learning community worked as a trigger and as a compass, helping learners to recognise and reflect on previous experiences. Giving the opportunity and guidance, all learners went back to their experience, know-how and re-evaluated competences to plan the learning they would commit to. Thus, the personalisation of the learning happened on two levels. Individually, through negotiation fed by the community (collectively).

6.2 Discussion about the model COL4FASHION and its principles

First, it is important to highlight that the model COL4FASHION did not mean to be definitive or an ultimate solution for fashion design higher education. However, it certainly was unique in resorting to Heutagogy, Semiotics and Design theoretical approaches to support education in fashion design in online environments. Second, the aim or the motivation to this research was to propose a model that could support fashion design higher education within the flexibility, uncertainty and borderless of the digital,

virtual, and augmented technologies immersiveness that will permeate the future of creation, production, and consumption of fashion goods. Finally, the research methods and procedures verified the model COL4FASHION, from the definition of the theoretical framework and the learning principles (FDLP) that supported its implementation. The validation of the model, accomplished by testing it in a research prototype (the trial course unit), provided evidence to respond to the research question. Thus, data provided by the trial course unit was expected to activate the indicators of the research questions, evaluating the model components and subcomponents and the principles (FDLP). This meant that, while the model could accommodate different fashion design online courses (FDOC), with different parts and delivery mode, such as blended or hybrid learning.

These considerations responded to the research question:

Does collaborative online learning constitute a valid model, able to promote the constant update of knowledge in fashion design, efficiently, with high-quality standards at acceptable costs for the sector professionals?

The model COL4FASHION demonstrated to be valid and efficient to promote education in fashion design in collaborative and online environments, maintaining the quality and effectiveness levels.

The most prominent characteristic of the model was its learner-centredness and non-linearity, accepting that knowledge might surface from the learner or the learning community and that the learning path can change because of internal or external inputs. The model, built to assume learning as an uncertainty path and to adapt without losing its principles (FDLP), can promote the rapid update of knowledge.

The model components, Learning Discovery, and Learning Contract, created respectively to know the learner, and to negotiate the learning, prepared the Learning Experience component, opening to personalised learning pathways. Therefore, instead of presenting and imposing the learning structure and helping learners to comply with it, the model adopted empathy to understand learners' needs and expectations and prepare them to negotiate the learning experience. It started by asking learners (and companies) “who are you, what do you know already and to where you want or need to go from here?”. Since the negotiation allowed the adaptation of the learning experience, the model could adopt a prospective perspective, by listening and incorporating in its courses what learners brought.

In this sense, learners met their personalised expectations, while learning, and provoked constant review and update of the course. Thus, the Learning Contract component proved important in making learners autonomous and more responsible for defining their own learning, but also it demonstrated to be a valid tool to keep the course updated.

So, while the Learning Discovery subcomponent, learner-centred (Lce), promoted personalisation through negotiation, the learning community subcomponent (Lco) instigated the collaborative learning experience subcomponent (c-LE), to be carried out throughout the learning experience (LE), representing a perspective more aligned with the teamwork reality of the professional landscape. The Lco subcomponent also considered that knowledge was built together by the exchange of ideas, resources, and previous experiences, which impacted learners on an individual level.

The Learning Experience represented the more adaptable component of the model since its subcomponents presented negotiable fields.

While it was easily acceptable that the o-LE subcomponent encompassed the negotiation of the materials, resources, activities and tools, this same process of negotiation would influence the knowledge updating. Digital and technology-based tools, for instance, brought different inputs and provoked a different way of exploring and interpreting reality. So, the very negotiation of this subcomponent influenced the access and manipulation of information and the updating of the entire learning experience (LE) component. The o_LE subcomponent could entail collaboration and connectivity and, therefore, instigate different learning paths and learning outcomes. Therefore, the learning assessment, and the learning outcomes, subcomponents of the Learning Experience (LE), were part of the learning process (instead of separated elements) but were influenced by it. Although defined and following institutional directives, they presented negotiable fields to accommodate the unforeseen changes during the learning experience. The difficulties in obtaining greater openness and more learner-centredness with the learning outcomes and learning assessment subcomponents surfaced when defining them and during the trial course unit. On one hand, the traditional mindset of establishing learning outcomes to be assessed in a certain way needed to compromise with the heutagogical (and design) perspectives of building them together with the learners. Some learners surpassed initial outcomes and negotiated the assessment, others felt the need for more defined and guided outcomes. So, the focus was in adopting a guided negotiation, starting from defined and approved outcomes that branched out into outcomes that made sense for the learner, that triggered deep changes, prospective learning that envisioned opportunities to apply the results in different scenarios.

As previously mentioned, the collaborative learning experience subcomponent (c-LE) happens when and if it forms a learning community. Giving opportunities to interact and connect, learning surfaces from reflective discussion and inquiring, which then guides collective or individual learning paths and outcomes. This proved to be the most challenging aspect during the test of the model in the trial course unit since learners started the trial at distinct moments and on different learning platforms. The groups

that started together interacted more, at least until the negotiation of the learning experience (Personalised Learning Agreement subcomponent), choosing individual paths later. So, while one group started as a learning community and then moved individually in the learning experience, the learners from the other two groups, who started the trial course unit in distinct moments, did not form a learning community and thus did not collaborate.[87].

Finally, the model COL4FASHION components and subcomponents proved to work interrelated to activate the learning principles (FDLP), which within the research perspective, ensured the consistency with the findings in the literature review and the exploratory research. Fashion design cannot thrive in inflexible, professional, or educational settings. Immersed in a global, interconnected, technological and increasingly ubiquitous context, the professionals of this sector work between the convergence of the analytic, detail-focused thinking with the innovative and creative one. Acceptance of the uncertainty and the predisposition for change were, together with technology adoption, the main specificities of the fashion sector. Sensitive and permanently aware of new opportunities and new experiences, fashion designers constantly and actively observe and (re)interpret the reality, anticipating future responses in fashion expressions, products, and collections. The theoretical framework helped define the learning principles (FDLP) considered coherent to fashion education, which ensured the specificities of fashion design education contemplated in the model COL4FASHION. The learning principles (FDLP) acted as a compass for the organisation of the model components and subcomponents and for its implementation in a research prototype (the trial course unit).

The fashion design activity is anticipatory. For that, a critical reflection about reality and about one's own practice and thinking processes is essential. Questioning and self-reflection guides learning, leading to agency, preparedness, and decision-making aptitudes. The components and subcomponents of the model COL4FASHION activated Reflective Thinking, adopting an enquiry-based approach, instigating learners to identify previous competences, defy their own beliefs, negotiate the learning experience, fostering self-determination and capability-based learning. An exploratory mindset, required in different phases of the (fashion) design development, helps to interpret and translate socio cultural signs into fashion outputs. The model activated the Research & Interpretation principle, not only acknowledging learners' previous experiences, or their inventory of knowledge, but also stimulating the reflective-exploratory capabilities, important in proposing coherent solutions to different contexts. This meant to

[87] James and Terry, who worked collaboratively in their projects.

develop the capability to (re)interpret an existing reality and imagine new designs, from the concept to the materiality (the Creativity & Imagination principle). In the model, the exploration and experimentation also promoted imaginative and creative capabilities that not only led to fashion creation, and innovative solutions, but also promoted different ways of learning. The communicative principle of fashion (Collaboration & Communication principle) required the model to accommodate opportunities for learning collaboratively, so that different and dispersed participants could collaborate to create a collection or research for a trend forecast. Finally, the fashion cycle works in a constant process of re-interpretation of new meanings and multiple reconfigurations. Therefore, to respect the Complexity & Uncertainty learning principle, the model's components / subcomponents were flexible and constructed around non-linearity. Without focusing on the acquisition of the content, but on how learners would interpret and extrapolate it, the model allowed different learning pathways to surface, from uncommon or unexpected connections.

Still, the model needed further testing to accommodate the intervenient (higher education institution, the learner, and the companies) and their needs. As an active part, the model COL4FASHION had two main functions, first to intermediate the learning experience, of ongoing competences, between the company (market) and the learner, through learning contracts and ensure that the learning experience met the requirements to both learners and companies. Then continuously collect information, update, and anticipate the competencies and capabilities, organising courses around broad areas of knowledge, even before individuals or companies identify the need for them. So, while the model can accommodate immediate courses, it also opens the possibility to long courses or specialisations that align with long-term strategic of the market. The model can ultimately diminish the lag between the detection and the learning of new sets of competence. It will also anticipate capability-learning strategies that explore and raise needs yet to become. On the personal development level, the model can contribute actively in two ways: negotiating learning between individuals and companies, and managing personal aspirations, activating self-determined learning under a lifelong learning perspective. In the discovery phase, the competence levels, assessed and negotiated, help to establish priorities in the learning experience, customised to each profile.

In all situations presented above, the learning principles (FDLP) maintained the values and the specificities of fashion design education, avoiding different intervenient influence the components of the model, depending on their point of view. If the student believes that knowledge is in the content to be delivered, then the instructional design and the institution are vehicle, intermediary, to deliver the product of learning. If the company considers knowledge as the procedures to perform a task, then

instructional design is expected to change or improving learner's procedures. But if knowledge is perceived as constructed meaning, by the company and the learners, then instructional design can provide the tools and resources and guide learners *how to learn and continue learning*.

While the challenge in education and learning environments would be to implement a system that maintains the level of negotiation and personalisation, without losing quality even with more students, scaling the model might come from streaming services, like Netflix, HBO or Amazon Prime Video, basing the negotiation on recommendation system that resorts to algorithms, machine learning and artificial intelligence (the algorithm recommends as more data is collected) to personalise every aspect of the experience of *watching movies and series online*.

6.2.1 Limitations, improvements, and contributions of the model COL4FASHION

The model presented some methodological limitations which might impact the results of the research. The limitations came from implementing the model as a research prototype, from the characteristics of the Learning Contract component, and related to the sampling selection.

The negotiation of the Learning Contract component was impactful and relevant to the dynamic of the model and the components. However, it presented concerns on how to maintain the negotiation on a larger scale, within a program, for instance. How to maintain the personalisation of the learning experience with twenty or one-hundred learners? This might generate twenty or one-hundred personalised learning agreements (PLAs). As an exploratory exercise, we could consider applications (apps) or recommender systems (that resort to data and algorithms) could personalise the learner's navigation through the Learning Contract, generating a suggested PLA, based on learners' responses, like the product recommendations in Amazon, for instance.

Another methodological limitation related to the need of implementing the model as a research prototype. Excessive workload (activities/timeframe) in the trial course might have overwhelmed the participants. Since the model needed to be tested efficiently and rigorously, the triangulation of methods and between methods, resorted to different ways of collecting information, through questionnaires, assignments, and meetings that participants needed to complete. Therefore, the focus was on setting the instruments of data collection rather than on the user experience.

An important limitation was the number of participants, resulting from the sampling process. Although many responded to the initial questionnaire, few applied and concluded the trial course unit. The initial expectation was to create two groups of four or six participants on two different platforms. But, after the initial weeks, the trial course remained with nine participants that were reunited on one platform. The

low number of participants and the separation of the groups impacted the initial engagement of the participants, which led to a weaker sense of learning community in the following weeks. This limitation affected the opportunities for peer feedback and certainly influenced the assignments, deliverables, and assessments. Although the trial course unit included asynchronous tools learners could use to communicate and collaborate weekly, and opportunities for synchronous meeting, few participants shared their projects with others and provided or received feedback. Still, in some group meetings, participants demonstrated motivation to discuss their ideas and permanent collaboration happened in a small group of two or three learners. People collaborate if they recognise the need to do it, to solve a problem, for instance. But, although some learners worked together, most of them developed their projects individually. Other factors also contributed to the lack of collaboration or to the impossibility of collaborating and the adoption of individual work: personal and professional problems, lack of technical resources, time zone difference, and learning style. All influenced the way participants engaged in the trial course unit.

Therefore, some adjustments, implemented in the final version of the trial course unit (set after the simulation period), emphasised more synchronous meetings, associated with a task to solve or activities that triggered the creation of micro-communities. Although more engagement and collaboration were expected, a positive aspect was the diversity of projects delivered by the learners, respecting the previous negotiation, which demonstrated that the Learning Contract component was relevant to the success of the learning outcomes.

A set of technical limitations, identified in the implementation of the trial course unit, related to the language barrier. While the trial course unit was in English, all nine participants were Portuguese native speakers. Although some of them understood English, they had different levels of language and some were not fluent, which demanded more time to consult resources, which compromised the comprehension of the activities. Translating all the resources would implicate building another platform, which would jeopardize the schedule of the observation period and the entire research. Therefore, the researcher translated the most important documents and made them available to the learners, when required.

Another technical limiter was the platforms itself and the features they offered, the resources available to create the content (PowerPoint and voice recording) which were not state-of-the art or user friendly. Although more appealing resources in the Moodle platform used Scorm packages, participants considered they did not create engagement with the content, since they were not direct available in the lesson page. In this aspect Thinkific platform was ‘ready-to-use’, easier to implement and to engage

with, since it presented the information directly in the lesson's page. Since the researcher lacked the specific knowledge or time to implement the required changes in Moodle one participant opt to join the Thinkific platform, finishing the trial course unit successfully.

While the researcher had the motivation to improve the learning environment using technology-based tools that were easy to use, a final limitation verified the limited engagement between the learners and the tools provided, such as Miro, Milanote or Trello. Although learners recognised the potentiality of these tools for their fashion design projects, few of them, by convenience or lack of technological skills, used to the suggested tools to plan and develop their projects, or to share the projects with the colleagues. The adoption of the technology-based tools in the trial course unit, was supported by the theoretical approaches of the model COL4FASHION (online learning subcomponent, o-LE), expected to stimulate the creation of a learning community, through connectivity and shared goals, helping learners to develop their projects.

Although the relation between the technology-based tools in the learning platform was not the core of the study, participants' satisfaction when using one or other tool, have an impact on the learning outcomes and deliverables. A certain level of comfort around technology and technological innovations (resources, platforms, devices, concepts) was desirable and constituted a challenge for the model implementation. This was true not only in the usage and accessibility level of the software (platforms and applications), but also in the predisposition for connectivity. Online sharing, conferencing, collaborating can intimidate and can bring questions related to security and privacy. Since the model tested with participants that were acquaintances or referred by acquaintances of the researcher, the privacy or intimidation was not an issue. However, it could become a serious barrier to implement the model to larger audiences. Therefore, this aspect required further improvement and a possible solution would be to embed technology-based tools in the learning platform, making it easier for learners to select and experiment with them depending on the nature of the project, or using them to complete the assignments directly on the platform, individually or collaboratively. For that to happen it was acknowledged the need of further collaborations with different professionals such as instructional and user experience designers, e-learning developers or learning architects, deep learning specialists, among others that would help integrate technology features in the components and subcomponents of the model, providing a qualitative improvement of the COL4FASHION experience.

Another limitation was the impossibility of performing an in-depth quality analysis of the trial course unit, based on systems for online learning. The Specific Review Standards from the QM Higher Education

rubrics supported the instructional design of the trial course unit. However, its standards[88] focused on pedagogical approaches and provided few spaces for negotiation of the learning components. Therefore, the research opted to use the learning principles as guidance for quality and resorted to heutagogical principles when defining the components of the trial course unit.

A final and important aspect that needed further examination when implementing the model was the heutagogical stage of the learners. As explained by Hase (2009):

> "The educator needs to be able to identify when the learner has reached this level of sophistication, be prepared to relinquish control, and then negotiate new learning and assessment strategies depending on the direction in which the learner is heading." (Hase, 2009, p. 48).

This implies that not every program, student, professional, institution or company is suitable for the model of learning, as implemented and tested in this research. The self-determined stage and reflective learning path may be more effective in some situations than others. Authors explained that in certain groups or in learning processes, learners evolve between pedagogical - andragogical - heutagogical stages (PAH) in which the learner's agency increases as the teacher's control decreases (Bhoyrub et al., 2010; Brindley et al., 2009; Chacko, 2018; Hase & Kenyon, 2000; Palaiologos, 2011; Parslow, 2010). Programs and students might expect different levels of freedom, participation, creativity, autonomy. However, although heutagogy might be more suitable for certain circumstances, programs, learning levels and learners (or teachers), this did not mean that its principles would not contribute to the model, nor that they do not deserve to be studied for the fashion design education.

Improvements in the model COL4FASHION

The model COL4FASHION and the relations between its components underwent changes throughout the research: before and after the implementation in the research prototype, and during the observation period of the trial course unit. In the first version of the model, the Learning Experience was a section, not a component, that divided the Learning Discovery (LD) component from the other components: Online Learning Experience (o-LE), Collaborative Learning Experience (c-LE), Learning Outcomes (Lo)

[88] The QM eight general standards: Course Overview and Introduction, Learning Objectives (Competencies), Assessment and Measurement, Instructional Materials, Learning Activities and Learner Interaction, Course Technology, Learner Support, Accessibility and Usability.

and Learning Agreement (La). In this version the learning contract was a part of the Learning Discovery (LD), a document of moderate importance.

As the research advanced, and more understanding about the role learning outcomes and learning assessment have in heutagogical learning, the o-LE, c-LE, Lo and La became subcomponents of the Learning Experience (LE) since they largely contributed to its success. After the trial course unit, and based on the results, the Learning Contract became a separate component, emphasizing its relevance to negotiate and personalise the learning. Finally, the Learning Content and the Learning Goals, representing the institutional perspectives, became adjacent components, defined outside the model.

Improvements in the trial course unit

In the trial course unit, the evaluation stages of the design method (Delft basic design cycle) helped to implement changes rapidly, as soon as the simulation of the research prototype (observation period) started, to incorporate the participant's suggestions. The first change was the platform, from Google Classroom used as a first test with few acquaintances, to the Moodle LMS and Thinkific platforms. Once the trial course unit started, participants required more accuracy in the information of the Personalised Learning Agreement (PLA), in Google Forms. As previously mentioned, the Learning Contract (LC) surfaced as a component and more emphasis was placed in the negotiation of the PLA. Hence, an individual meeting, included after learners filled out the Personalised Learning Agreement (PLA), helped to clarify further doubts. Calendars, included in both platforms, announced the weekly meetings and the final delivery date. Lessons were improved with more examples and visual resources as per the request of the learners. Some activities in the Discover and Define parts of the trial course unit became optional, since they proved to be redundant for the testing and the research. More promotional material, such as short videos, digital flyers, and GIFs, were created to invite more participants.

During the focus group (Part1, Activity 3) participants suggested, for instance, more information about the deliverables, demonstrating how they align with the learning goals of the unit and with the learning outcomes as negotiated in the PLA. They also mentioned the need for more assessment feedback on the activities and projects and suggested the participation of external examiners, besides the learning community. Although they could use the learning community to talk freely and receive unofficial feedback, an improvement would be to include in the lesson's specific questions or quick activities and tasks to be completed in groups, synchronously or asynchronously (Figure 35).

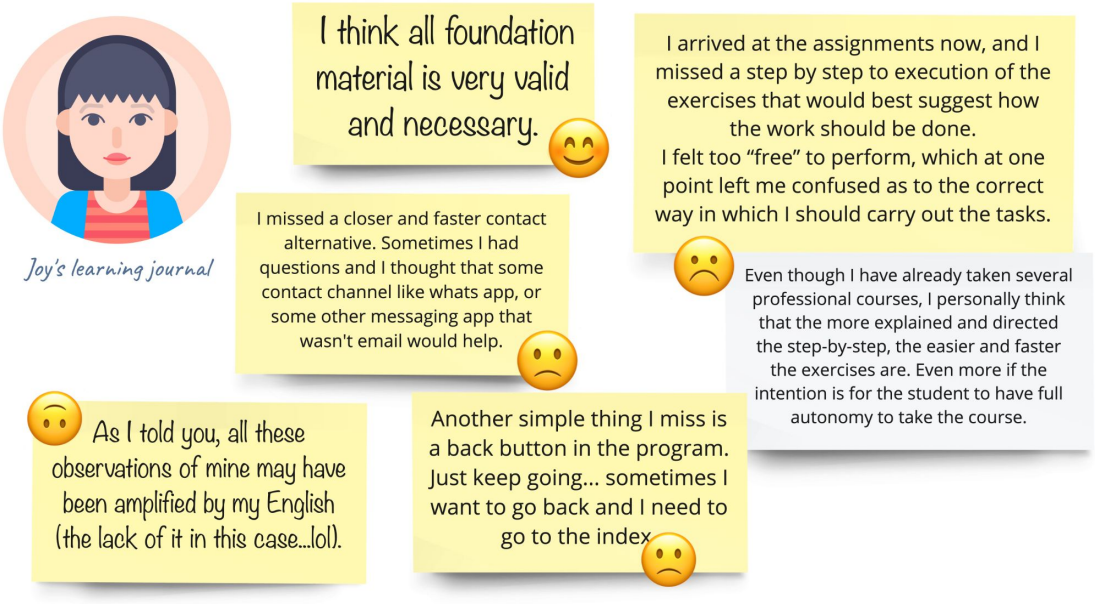


Figure 35 - Joy's "pains and gains"

Further improvements suggested for the trial course unit

- Automatise the fields learners can negotiate in the personalised learning model (PLA) document.
- Resort to more interactive and user-friendly content creation tools to make it more appealing.
- Create animated videos to explain each part of the course and resort to infographics to explain the assignments (Andy's suggestions).
- Embed technology-based tools on the platform so learners don't need to leave the environment to complete the assignments.
- Create shared environments (such as Trello, Millanote or Miro) where learners can complete all the assignments of the Discover part.
- Reorganise the assignments of the Discover part. Glocal Fashion, Fashion Network, Fashion Prospective Perspective and Future in/for Fashion could be topics of discussion in the assignment *Fashion Circle*.
- Review the feedback and feed-forward task in relation to the type of work shared by the learners. Assignments can be completed directly on the platform, facilitating the feedback.
- Include quick questions to increase participation in the discussion tabs (on the Thinkific platform).
- Create multiple deadlines according to the entry schedule of the learner.

6.2.2 Contributions of the model COL4FASHION for fashion design education

The perspective of this research was that collaborative and online learning environments, free from the physical frontiers of traditional classrooms, stimulate the formation of more diverse learning communities and shared resources to promote innovative, meaningful, and contextualized fashion design ideas and solutions. These learning environments help learners gain self-determined, autonomous, and prospective capabilities that will help them navigate under uncertain professional scenarios.

The theoretical framework with its learning principles (FDLP) helped develop the COL4FASHION model to ensure a flexible approach to the learning components and subcomponents, favouring a learner-centred, flexible, non-linear, collaborative, and personalised learning experience, still maintaining truthfulness to the institutional strategies.

Although testing the model through a trial course unit, denominated FDOC[89], the perspective was that the model could accommodate diverse and individual "FDOCs", all supported by its principles (FDLP), working as parts of a system through which the learner navigates (Figure 36). Guided by the Personalised Learning Agreement (PLA), learners bring inputs that might change the parts and the system. So, while the learning principles and the components of the model are the same, changes in one FDOC would change the entire system, keeping it up to date. Each unit can focus on different subjects of a broader fashion design program, for instance, encompassing different activities, thus generating different learning paths and sub paths, adapted to the learners' profiles. The "FDOC" can be part of a specialisation that proposes learning paths defined by branches that interact but remain distinct, enriching the knowledge learners will acquire. This can define learning packages with two or three areas of knowledge and other secondary areas that adapt according to the profile of the learner.

[89] A typology of fashion design online learning courses, whose name was inspired by Mooc.

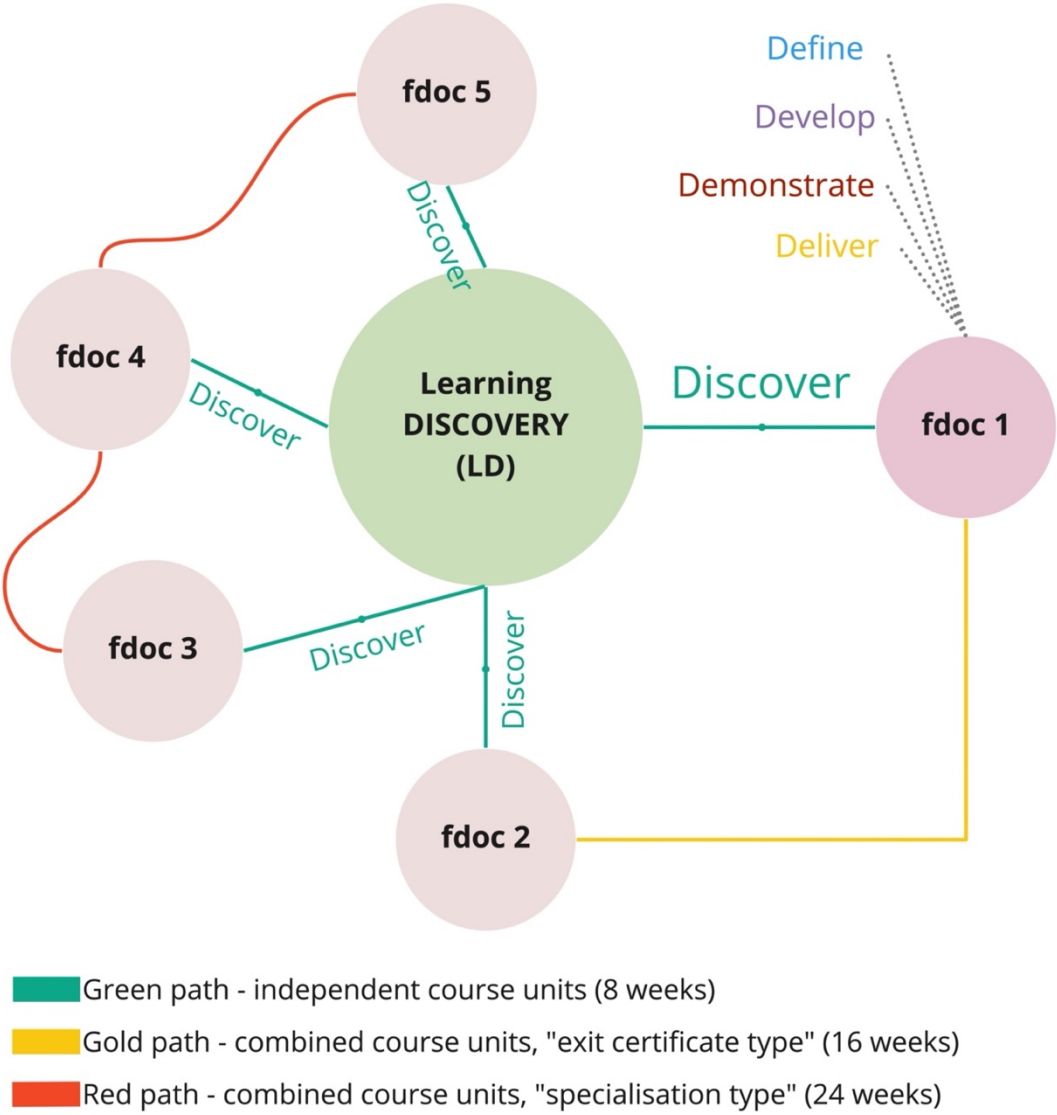


Figure 36 - Fashion design collaborative online system

The Double Diamond, used to organise the parts of this specific trial course unit, focused on a project-based learning. But different "FDOCs" can organise its parts differently, maintaining the same learning principles and components of the model COL4FASHION. This implies that organising the trial course unit differently, or with different profiles of the participants, the results of the model components and subcomponents would also be different. However, this does not jeopardise the validity of the model, it simply demonstrates that the model is adaptable to different course units and can accommodate distinct learning pathways, while maintaining its learning principles.

7. Conclusions

This research aimed to analyse possible models of learning for fashion design higher education more aligned or that could contribute to the future of the sector. Current models of education in fashion cannot address the needs of individuals and companies under a professional landscape immersed in digital technologies. The research also considered that collaborative, online learning models could provide prospective and personalised, learner-centred experiences, free of the geographical and time constraints.

To accomplish that, the research started by identifying the knowledge and skills defined for the fashion design professionals in a global market, considering the digital technology immersiveness. The exploratory research and the analysis of fashion education courses in the European Higher Education Area (EHEA) tried to understand what these sets of competences were. But it revealed the lack of fashion design courses, especially in online environments.

During the Covid-19 pandemic, fashion schools rapidly changed to online. Without proper theories or approaches to provide support or guidance, the courses significantly replicated the traditional models of education, transposing the 'onsite' model to online environments. This "new context" and the few studies on fashion design education motivated the research for new theories and learning models that could contribute to the online education of fashion designers.

Instead of focusing on the next set of competences, the research looked for a broader approach that could inform the capabilities required for a designer professional within a lifelong learning perspective. This meant to consider the set of knowledge and skills for their future in the fashion sector and the upcoming changes, instead of educating students to fit in the current job market. It required to consider the conceptual worker or the contextual professional, the one capable of establishing relations and thinking in terms of systems, connections, and networks. If fashion designers need to understand fashion under a broader, multicultural, complex, technologically immersive context, this also means rethinking the need for specialisations in fashion design education. Instead of thinking about a set of knowledge and skills, it required to consider generalisation, complementary and linked knowledge, that could apply in different contexts. Finally, this meant to review learning processes that would help learners to achieve these. This meant to identify the principles that these creative professionals would require in the future and how to help them become capable of shaping their future and recognise how and when to learn continuously. So, the next goals of the research were to identify the theoretical framework that could support the development of a collaborative online learning model for higher

education in fashion design that anticipates the acquisition of future competences, test the model and analyse its efficacy.

This research understood fashion design as an interpretation and communication of contemporary phenomena, as well as the social, cultural, economic, and environmental influence of the design process. Therefore, the semiotic approach to creativity seemed coherent not only to the design discipline but also to understand fashion design practice and thinking. Semiotics was relevant, as a theoretical approach, to understand not only the complexities of the fashion sector, but the openness of the digitally connected global landscape.

If pedagogy literally means "teaching children", then another perspective needed to be researched for higher education in fashion design. The andragogy approach proved more suitable to inform the model to be built. Although andragogy was student-centred and directed to adult learners, the teacher/program defined the learning goals, the learning content and assessment methods. However, the research on andragogy led to Heutagogy, the self-determined learning approach to education, and to studies of heutagogical, online, digital technologies, and environments.

Therefore, the Heutagogy approach was coherent with Semiotics and Design perspectives, and together they composed the theoretical framework that built the principles and supported the specificities of fashion design education. By defining the theoretical framework and the learning principles of the model, it was possible to study coherent instructional design, and define the methods to test it and generate the research procedure.

The research evolved non-linearly, in loops of improvements and reviews, moving back and forward to connect the theoretical framework, the learning principles, the model, and the testing. So, while exploratory research resorted to divergent process to gather (new) knowledge in fashion design education, contextualise and frame the initial problem (the online offer in higher education), the convergent process guided the goals of the research, formulate the research questions, and determine the research design, sampling method and data collection methods. Undoubtedly, the analysis methods (framework analysis) were keen to correlate and interpret the amount of information and data collected.

7.1 Contributions to the field of knowledge

The results of the research demonstrated that resorting to the coherent set of theoretical approaches and fundamental principles was essential to envision, develop, implement, and evaluate a collaborative learning model for fashion design in online environments. Heutagogy, Semiotics, and Design perspectives that formed the theoretical framework proved to be one way. Thus, the model contributed

primarily to theory development within the fashion design education, and within the online education of fashion design. This investigation also contributed to further discussions of alternative models of learning for fashion design education, considering blended, immersive, or onsite settings, in the quest to provide high-quality education from a scientific, technological, and academic point of view.

Fashion design education needs more investigation to respond to current changes and to future changes in the sector. One cannot expect that fashion designers will be the ones responsible for creating new collections in the next five to ten years the same way they have done since the twenty-century. Similarly, fashion consumers will not consume fashion products in the same way. This is a reductive vision of the role of fashion designers and consumers within the technological changes in the production, distribution and consumption of clothing and disregards the need for alternative resources, techniques, and channels of production and distribution.

So, this research considers having contributed to the reflection of flexible and open models of education in fashion design, considering the delivery mode, the learning components of a learning experience, the assessment choices and the principles that can guarantee the learning quality. This research investigated possibilities for the fashion design education, for the exploration of new ideas and new processes of learning that study technological development instead of rejecting it. The research contributed to rethinking three aspects of learning that we believe will characterise the future of fashion design education in online environments: the personalised, the collaborative and the prospective learning.

Personalised learning does not mean individualised learning. It allows learners to participate in deciding the learning pathways. The analysis of the model showed that this is possible if the instructional design contemplates negotiation of the learning components instead of controlling them. This not only promotes self-determined learners, but maintains the model heutagogical, through negotiation and capability development, placing learners as active contributors of their learning experience while it remains aligned with institutional social commitment of educating and empowering individuals to keep learning.

Collaborative learning means to recognise not only that fashion design is a collaborative endeavour. It means to understand that design teams and consumers, scattered all over the world, learn from a community, of from the professional networks, as much as from the learning environment. This means that the model is semiotic because it recognises knowledge brought by the learner, from the market, by the agents of the fashion sector, and converts it into courses or programs with innovative perspectives, promoting capabilities to different adult individuals to apply in uncertain scenarios.

Prospective learning relates to fashion characteristic of anticipating changes defying the sociocultural paradigms and presenting innovative, not definitive, solutions. However, education of fashion designers focuses on specialisations and does not embrace designers that can navigate the complexity of its system. The model is design-led in considering openness to keep improving the offer as it understands the learner's needs and contextualises the learning experience, instead of obsessing about establishing specified results.

Other contributions of more practical order were:

- Consider learner-centred and capability-learning theories, especially aligned with the creative areas of design and the specificities of fashion design holistically.
- Study on theories that supported the adoption of digital technologies as essential for the future of fashion design education but not to reinforce new competences or reproduce the same tasks more efficiently. Instead, to educate reflective thinkers, context creators, and cooperative teams that can experiment with the components of the fashion creative process to promote innovation and change in the sector.
- Resort to theoretical approaches, grounded by constructivist perspective (heutagogy, design and semiotic) with a robust body of studies to propose a collaborative, online learning model and to rethink the role of the learning components to ensure valid and meaningful learning experiences.
- Focus on the stages that precede the development of fashion products/collections because these stages require reflective thinking, research, and interpretation capabilities, which contributed to the different pathways that surfaced during the learning process.

7.2 Further studies

As with many previous periods of crisis, the Covid-19 pandemic caused a disruption in different sectors, and that accelerated the ongoing changes in models of learning. Still, education institutions need to reflect on how they will contribute to validate and qualify these new ways of learning either integrating them in their offer or validating the competences to incentivise capability learning.

While digital, virtual, augmented reality, artificial intelligence technologies are being studied, experimented, and tested in different sectors, with valid examples in fashion design services and retail, fashion design education still focuses on competence acquisition that will not be compatible with the practice of fashion in the future. While innovation in the education sector happens sequentially, in the fashion sector, it happens iteratively or incrementally. Education in fashion design can experiment and use digital, immersive technologies to value craftsmanship, to make processes more transparent and

to test more sustainable options. The research attempted to envision the future of learning in fashion design, in the technologically immersiveness of the learning/working environments, which will force fashion companies and the fashion system to encompass more collaborative and cooperative, personalised and user-centred, sustainable, and inclusive practices.

The theoretical framework and the principles of learning that grounded the collaborative online learning model figured as starting points for future studies in fashion design education, especially considering the limitations and potentialities of online, digital, and more immersive environments. They also entailed possibilities for studying heutagogical, as well as semiotic and design-based benchmarking for the quality of online learning fashion design courses.

More investigation needs to be done in the wide array of educational models and processes that might surface in the next few years, thanks to the technological advancements, from the two-dimensional e-learning platforms to three-dimensional immersive environments. Changes in technologies will continue influencing the learning experience, the tools used, the way people will interact with them, how to prepare and deploy the contents, the roles of the learner and the teacher in generating learning, the relations between learning and working, the learning experience. All these are potential areas of study that will also influence the fashion designer profession, the fashion consumption, fashion design learning, and the entire sector. Fashion design will align more and more with user experience, user interaction, augmented reality to decentralise the creation, empowering users to be both a content generator and a content consumer. Schools and companies have been resorting to computer assisted design software, and more recently to 3D technologies, in fashion and in different areas of design, to support different processes of creation and production, which will also challenge the concepts of consumer as the receiver of the product, to one co-creating their own fashion products. As interaction, collaboration and access to information enhance in daily lives, they contribute to create different behaviours towards learning that transcend the classroom and put pressure on traditional education settings even further.

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APPENDIX A

The components of the model COL4FASHION

Table A1 summarises the collaborative online model for fashion design (COL4FASHION), with its components and subcomponents, as well as the implementation in the trial course unit and relations with its five parts: Discover, Define, Develop, Demonstrate and Deliver.

Table A1 the components and subcomponents of the model COL4FASHION.

Institutional Learning Goals (LG)

Model COL4FASHION, components and subcomponents	
Learning Discovery (LD)	Learner Community Learner Centred
Learning Contract (LC)	Personalised Learning Agreement (PLA)
Learning experience (LE)	Collaborative Learning Experience (C-LE) Online Learning Experience (O-LE)[91]
Learning Assessment (LA)	
Learning Outcomes (LO)	

Learning Content (LCo)

The model implemented in the trial course unit (five parts)[90]	
Discover	analyse, examine, observe, document, negotiate, personalise.
Define	investigate, research, identify, problematise, interpret, idealise, plan.
Develop	create, compose, design, experiment, test, interact.
Demonstrate	justify, assess, review, prioritize, recommend, rate, inspect.
Deliver	complete, present, synthesise, solve, elucidate, inform.

activate the FDLP

[90] An exercise that associated achievements verbs (based on the action verbs of Bloom's revised taxonomy) with the five parts of the trial course unit, considering its iterative cycles of learning (design process).

[91] Learning methods were not in the model, since they related to the specificities of each course unit: the means (what, how and why) used to support learning. For the same reason it is part of the o-LE subcomponent. So, by negotiating the o-LE, learners were able to negotiate the learning methods.

The Learning Discovery (LD) component and subcomponents

Table A2 the implementation of the Learning Discovery (LD) component

Which? Learning component (identify)	Learning Discovery (LD) component subcomponents: learner centred (LCe); learning community (LCo)
What? the learning component will do (describe)	Introduce the course unit and the learning environment form a learning community
Why? the learning component will do it (justify)	Reflect and defy one's perspectives while resolving activities
How? the learning component will do it (activities, materials, resources, tools)	Six groups of activities: Individual and group level questionnaires, assignments, meetings.
Where? When? In the FDOC, five parts	Discover part: estimated time to complete: one to two weeks
Who? the role of the ones involved	Learners complete the activities PLM helps learners to reflect and identify their motivations and expectations and prepare them to negotiate the PLA.
The main learning principles (FDLP) activated: Reflective Thinking, Collaboration & Communication, Research & Interpretation, Creativity & Imagination.	

The Learning Contract (LC) component

Table A3 the implementation of the Learning Contract (LC) component

Which? Learning component (identify)	Learning Contract (LC) subcomponent: Personalised Learning Agreement (PLA)
What? the learning component will do (describe)	Negotiate the standard Learning Contract (LC) Define the Personalised Learning Agreement (PLA)
Why? the learning component will do it (justify)	To align the institutional, collective, and individual learning goals, ensuring a personalised and valid learning experience.
How? the learning component will do it (activities, materials, resources, tools)	Course unit documents. PLA questionnaire in Google Form. Individual meeting with the PLM (personalised learning manager).
Where? When? In the FDOC, five parts	At the end of the Discovery part
Who? the role of the ones involved	Learners negotiate the Learning Contract (LC) and define the PLA PLM helps learners to negotiate the LC and sign it. PLM guides teachers to the negotiated PLA
The main learning principles (FDLP) activated: Reflective Thinking and Complexity & Uncertainty.	

Learning Assessment (La) and Learning Outcomes (Lo)

Table A4 the implementation of the Learning Experience (LE) component

<table>
<tr><td>Which? Learning subcomponent (identify)</td><td>Collaborative (c-LE)</td><td>Online learning experience (o-LE)</td><td>Learning assessment (La)</td><td>Learning outcome (Lo)</td></tr>
<tr><td>What? the learning component will do (describe)</td><td>Work together, collaboratively, providing and receiving feedback.</td><td>Materials, activities, resources, and online environment (platform).</td><td colspan="2" rowspan="2">Consult tables A5 and A6</td></tr>
<tr><td>Why? the learning component will do it (justify)</td><td>Develop intellectual resources (individually or collectively)</td><td>• Engage in different situations (uncertainty).
• Experiment with given or other tools depending on the project.
• Ensure a flexible, open learning environment.</td></tr>
<tr><td>How? the learning component will do it (activities, materials, resources, tools)</td><td colspan="2">Assignments, questionnaires, quizzes, and group meetings. Through learning activities (scheduled, tutoring) and independent activities</td><td>Formative Assessment Rubrics (FARs)</td><td>Summative assessment</td></tr>
<tr><td>Where? When? In the FDOC, five parts</td><td colspan="2">Define, Develop</td><td colspan="2">Demonstrate, Deliver</td></tr>
<tr><td>Who? the role of the ones involved</td><td colspan="4">Learners
• Develop and deliver the projects, resorting to the LCo, o-LE receiving and providing feedback (c-LE)
PLM
• Guidance and support for the development of individual projects and outcomes.
• Ensure that learners are true to the PLA.
• Reinforce the FDLP principles.</td></tr>
<tr><td colspan="5">The main learning principles (FDLP) activated: Reflective Thinking, Collaboration & Communication, Research & Interpretation, Creativity & Imagination.</td></tr>
</table>

Table A5 requirements of the implementation for the La and Lo subcomponents

Learning subcomponents	Supported by the Heutagogy approach	Supported by the Design approach
Learning assessment	• Emerges from the learning experience (LE). • Continuous process, collaborative and self-reflective. • Instigates loops of learning, moving forward and back (incremental learning). • Formative and summative[92].	• Results assessed based on the (maximum) expectations, defined in the negotiation – level of achievement. • Instigates corrective cycles of analysis, synthesis, simulation, and evaluation, moving backwards and/or forward.
Learning outcomes	• Not definitive, but 'good enough' to generate new learning pathways and opportunities for improvement. • Negotiated between the learners and the educational institution. • Contextualised, coherent with the learner's expectations.	• Results are open, "provisional designs" • Meaningful and contextualised for the user/learner.

[92] As defined in the Learning Contract.

Table A6 Formative Assessment rubrics (FARs) and negotiated Lo

FARs	How	What?	Negotiated Lo	FDLP
Negotiated	Learning Contract PLA	• Applicability in learner's professional/personal lives?	Learner-centred; defined together with the learners; reflect on what and how to achieve, in and beyond the course.	Creativity & Imagination Reflective Thinking
Self-reflective	Reflective journals	• Activities, resources, tools, learning community, promoting different and emergent learning paths. • Moments of "calibration" • Provoked change in learners' mindset? Reflection on the processes?	Broad; ignite innovative processes, exploration of provisional solutions, unplanned discovery, and new learning opportunities.	Research & Interpretation
Collaborative	Feedback and feed-forward		Constructive feedback, built from the interactions with the learning community.	Collaboration & Communication
Non-linear	Unexpected outcomes	• Embraced error as opportunity for future learning? Results satisfied and were open 'enough' to feed new ideas?	Capability-based; learners apply in different unexpected situations; not final, closed, definitive.	Complexity & Uncertainty

APPENDIX B

Learning Contract

This document presents instructional directives and procedures for the learning components, to complete a course unit offered 100% online and specifically thought for the fashion design sector. In this **Learning Contract (LC)**, some learning components are negotiable (**NLC**). Learners can personalise their learning experience, if it follows the 'Conditions of negotiation of learning components', indicated at Annexe 1 of this document. The negotiation results in the **Personalised Learning Agreement (PLA)**, a supplementary document of the Learning Contract.

Course Unit name	Fashion trends, fundamentals of fashion design collections
Learning Model	100% ONLINE
Level	course unit
Duration	eight weeks

LEARNING CONTENT (LCo) **NLC**

In the fashion sector, brands need to innovate constantly, offering collections to the market and their customers. Understanding how fashion design, through a creative and imaginative process, identifies and coordinates information, fashion trends, consumer and market demands with brand objectives is the main objective of this course unit. Grounded on a semiotic applied approach, and supported by concepts and methods of trend analysis, this unit will challenge learners to explore, decode and convert material and visual information into innovative designs. It also provides an opportunity to practice with stages in which the fashion designer manipulates and transforms information into fashion outputs, such as products and collections, with added value and competitiveness for fashion brands.

Syllabus and content

- *Fundamental concepts of fashion design collections*
- *Fashion Trends, main concepts, and sources*
- *Notions of Brand identity*
- *Planning/Structure of fashion design collections for a brand*

LEARNING GOALS (LG)

This course unit objective is to convert/translate fashion trend information into elements fashion brands need to structure/plan their product lines or collections.

The goals of this course unit are:

LG1 Understand fashion trend concepts and elements.
LG2 Identify the criteria for the selection of coherent fashion trend information.
LG3 Assimilate fashion trends elements into the brand's creative process.

LEARNING OUTCOMES (Lo) **NLC**

On satisfactory completion of this course unit, you will be able to:

LO1 - explore, select, and evaluate valid trend sources and resources, information, materials, and techniques, adequate with the fashion brand.
LO2 - decode the information searched into essential elements for the development of fashion products, projects and collections that are consistent with the brand identity and with its context (industrial or atelier).
LO3 - Use coherent and innovative tools to conceive, 'communicate' and visualize the ideas.

LEARNING METHODS — NLC

Hours of scheduled activity at the online platform	24hs*
Hours of independent activity	76hs (in accordance with the learner profile)
Total workload (estimated)	100hs

* 3hs scheduled activity (contact hours) per week, according to the following distribution:

Scheduled activities (SA), 1h - 2h/week

synchronous
- webinars
- video conferences
- collaborative assignments
- mobile-based activities

asynchronous
- video lessons
- activities and resources at the online platform
- group forums
- collaborative assignments
- mobile-based activities

Tutoring (TU), 30min - 1h/week
individual or small groups.
synchronous or asynchronous sessions.
supervision, support, and feedback.

LEARNING ASSESSMENT (La) — NLC

Learners can choose one of the weighting systems W1, W2 or W3, as indicated in the table below:

Learning Assessment Components				Weighting (%)			Word Count
Assessment Type	Learning Assessment Category	Assessment Deliverables		NLC			
		NLC		W1	W2 ***	W3 ***	
Oral presentation	Practical	D8_6	Presentation of the project: live or pre-recorded	10	10	10	Not applicable
Written assignment	Coursework	D8_5 **	Self-assessment	10	10	10	500 - 1000
		D8_1	Trend Study: written brief or essay.	20	25	10	
Report		D8_2	Market and target study: report	20	25	10	
Set exercise		D8_3	Brand study	20	25	10	
Project output		D8_4 *	Fashion design project, including outputs from D8_1, D8_2, D8_3	20	10	50	

** Includes Feedback/feedforward assignments, each accounting for 5% of the final weighting, as follows:*
- *In Define and Develop - the development of the project. Provided by the learning community (and external community).*
- *In Demonstrate - initial outputs on the project. Provided by the learning community (and external community).*

*** Includes Self-scoring assignment, that accounts for 5% of the final weighting.*

**** Negotiated weighting, consonant to learner's profile, as indicated in the learner's PLA. W1 is considered when learners opt not to negotiate the PLA.*

Summative Learning Assessment Criteria

General criteria	• participation and collaboration contributions to other projects • reflection about expected versus delivered outcomes • quality of work • academic soundness
Specific criteria	**Knowledge of (concepts and resources)** Analysis, evaluation of fashion trends elements relevant to fashion brand's creative and commercial development.
	Understanding through application Synthesise and generate ideas and proposals preceding the development of fashion design collections.
	Technical and applied skills Application of written and visual communication techniques and tools to create professional presentations. Participation in group activity and individual development**.**

READING LIST

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ANNEXES

Annexe 1

Conditions of negotiation of learning components

Negotiable Learning Components	Conditions of negotiation
Learning Content (LCo)	• You can propose new, updated, and contextualized topics - (eg.: from/for the workplace). • You can implement/update the content during the learning experience.
Learning Outcomes (Lo) *	• You can propose Lo (eg.: from/for the workplace). • You cannot exclude Lo proposed in the course unit.
Learning Experience (LE)	• Online Learning Experience (relates to the **Learning Methods**) • No. of hours of the scheduled activity at the platform is not negotiable. • You can propose new scheduled assignments. • You can use different tools from the ones suggested. • You can develop the assignments Individually or in groups.
Learning Assessment (La)	• You can add new Assessment Deliverables but cannot remove any. • You can choose the Weighting system (W1, W2 or W3).

Guidelines of negotiation for the learning outcomes (to discuss during the Individual Meeting)

1. Consult the subjects described in the Learning Content (LCo). How much do you know about them? Which one you master, and which one you want/need to deepen your knowledge and skills? Use the Discover assignments to reflect about it.
2. Reflect on your own professional experience. Question your role in the future of the sector and identify the competencies you consider will be relevant. Use the Discover assignments to reflect about it.
3. Review the Learning Outcomes (Lo) described in this document. Do they meet your personal/professional expectations?
4. Do you want to propose another Lo? Is this coherent, complementary, relevant for the LCo and LG?
5. How to assess (La) the new Lo? Is it observable through the Assessment Deliverables? Measured by the chosen weighting (W1, W2, W3)?
6. Write down the LO, using action verbs and short sentences.
7. For this course unit, you can propose up to 3 new learning outcomes.

Annexe 2

PERSONALISED LEARNING AGREEMENT (PLA)

Include here the learner's PLA

MANIFESTO

Presentation

This manifesto expresses the perspectives about learning in online environments, primarily focusing on the specificities of the fashion sector. It presents a learning model, with its components and how it was 'implemented' in a fashion design course unit, delivered 100% online.

Relevance for the fashion sector

Although materials, forms and functions are at the core of fashion design practice, the creative fashion process presupposes an understanding of the social and cultural codes that influence consumers lifestyles, behaviours, and perceptions about clothing. These cannot be achieved individually but in learning environments more aligned with a globalised, connected reality.

The learning model, for fashion design

The implementation of the learning model resorted to theoretical perspectives that accommodated learning in fashion to cover its complexity and cross-disciplinarity, its constant need for innovation and creativity, and its fast-paced process to respond to the market demand. In the learning model proposed, the learning experience ought to be constructed together with the learner, so they can re-conceptualise their assumptions. This is expected to promote anticipatory, reflective thinking, required while observing reality, assessing the uncertainty of problem-solving situations, deciphering the codes of the complex system of fashion, and materialising them as appealing outputs.

The Learning Model

The model allows the negotiation of the learning experience between the learner and the teaching institution. On the other hand, it also respects the equity between courses and remains truthful with institutional strategies and educational commitment to society.

- Learning Discovery (LD) - introduction to the model. It includes the Personalised Learning Agreement (PLA).
- Learning Experience (LE) - online and collaborative.
- Learning Content - flexible and non-linear.
- Learning Goals - institutional perspectives and social commitment to education.
- Learning Outcomes (Lo) - results learners wish/need to achieve.
- Learning Assessment (La) - formative and summative assessment.

The fashion design online course (FDOC)

The learning model, its principles and learning components, is being tested as a trial course unit, offered 100% online, resorting to learning management systems or learning platforms. The course unit is ruled by the Course Unit Descriptor, that represents the institutional strategy and presents instructional directives and procedures for the learning components, to its successful completion. The course unit was organised in five interrelated 'parts': Discover, Define, Develop, Demonstrate and Deliver.

Personalised Learning Manager (PLM) role

- Provide guidance and clarify information, while supporting projects and expected outcomes.
- Negotiate the PLA and ensure that learners are faithful to it.
- Ensure that the learning experience respects and activates the principles of the learning model.
- Ensure that institutional learning goals and the Learning Contract are respected.

Learner's role

- Navigate through the content, expanding it with valid and coherent subjects.
- Negotiate the learning components and elaborate the PLA.
- Make every effort (individually or collaboratively) to achieve the expected learning goals and outcomes.
- Maintain truthfulness to the PLA and respect the Learning Contract.

Table B1 Process of negotiation of the Learning Contract

The negotiation process enables the emergence different (hence personalised) learning paths, defined by different levels (majors and minors; primary or secondary) and by different areas of knowledge.
It can happen at a lower level, between the learner and the institution or between the institution and socio-economic agents, at a higher level.
Process: 1. Learners complete the activities of the Learning Discovery (LD) component. 2. Learners consult the Learning Contract, and other course documents. 3. Learners complete the form "personalised learning agreement (PLA)" or choose the standard the terms of the Learning Contract. 4. Learners and the personal learning manager (PLM) meet *(D1P5.3_individual meeting*) to clarify, align, and validate the negotiation, following the "conditions of negotiation" for the negotiable learning subcomponents (NLC). 5. The PLM informs the learner and the course staff (of a program or a course unit) clarifying what to expect from 'negotiated learners' at various stages of their courses or classes. 6. Course staff provide, as part of the formative assessment, written or oral feedback about the negotiation of the PLA, maintaining it or proposing changes. 7. PLM generates the final version of the PLA. 8. PLM attaches the final version of the PLA to the Learning Contract (in the learner process), depicting the negotiated fields, which represent learners' intentions for his/her learning experience, the learning plan to respect the deadlines (self-organisation), expectations regarding learning outcomes (Lo) and how they know they achieved them (La). 9. A summarised copy of the PLA can accompany the certificate to inform potential companies of the specificities of that training for that professional.

APPENDIX C

The exploratory research

Table C1 exploratory research EHEA documents, agencies, and parameters

International agencies	United Nations Educational, Scientific and Cultural Organization (UNESCO), International Council for Open and Distance Education, (ICDE), and the International Network for Quality Assurance Agencies in Higher Education (INQAAHE). US Council for Higher Education Accreditation (CHEA), from the International Quality Group (CIQG) and the World Higher Education Database (WHED), from the International Association of Universities (IAU).
Distance Education associations	European Association for Distance Teaching Universities (EADTU) with the 'European quality benchmark for online, open and flexible education' (E-xellence). European Association of Distance Learning (EADL). European Distance and E-Learning Network (EDEN).
Design Associations	European Institute for Design and Disability (EIDD); International Association of Universities and Colleges of Art, Design and Media (Cumulus). National Accreditation guidelines or references adopted for the design area, and that contemplated fashion design.
European regulatory agencies	European Association for Quality Assurance in Higher Education (ENQA) and European Consortium for Accreditation (ECA). European Qualifications Framework (EQF) aligned with National Qualification Framework (NQF) and the tools: European Network of Information Centres in the European Region (ENIC), the National Academic Recognition Information Centres in the European Union (NARIC), the European Credit Transfer and Accumulation System (ECTS), the Diploma Supplement (DS), the National Qualifications Frameworks (QFs), the European Standards and Guidelines for Quality Assurance of Higher Education (ESG), the Database of External Quality Assurance Results (DEQAR).
European documents and initiatives	The European Commission (Europe 2020 and Europe 2030); Digital Agenda for Europe Initiative; Open Education Europe Initiative; Directorate General for Education and Culture (EAC) and Directorate General for Informatics (DIGIT), the Bologna Process, the European Centre for the Development of Vocational Training (Cedefop), the European Training Foundation (ETF), the Education, Audio-visual, and Culture Executive Agency (EACEA) and the European Commission Lifelong Learning Platform.
Bologna three cycles of study	The cycles were established by the Qualifications Framework in the European Higher Education Area (QF-EHEA), and are respectively equivalent to Level 6, 7 and 8 of the European Qualifications Framework (EQF) aligned with National Qualification Framework (NQF). The 1st cycle of qualification grants between 180 and 240 ECTS (European Credit Transfer and Accumulation System) and is normally completed in three years, and the 2nd cycle of qualification grants between 60 - 120 ECTS and is completed between one or two years.

Table C2 results of the exploratory research in (EHEA)

Fashion courses (EHEA-HEI)	Fashion, Design, and specialisations		Fashion Design focused			
	total	Online[93]	total	Online	with programme information	Accredited
BA or BA Hons	347	11[94]	238[95]	3	2	309
MA	192		118		—	
Total	539	—	356	—		

[93] Data from 2017

[94] In Cyprus, France, Italy, Kazakhstan, Portugal, Switzerland, and UK (England).

[95] In 37 countries. Armenia, Austria, Azerbaijan, Belgium Flemish community and Belgium French community, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Italy, Kazakhstan, Lithuania, Macedonia, Moldova, Netherlands, Norway, Poland, Portugal, Republic of Ireland, Romania, Russian Federation, Serbia, Spain, Sweden, Switzerland, Turkey, United Kingdom (Scotland, Wales, and England) and Ukraine.

APPENDIX D

Sampling, process of participants' selection

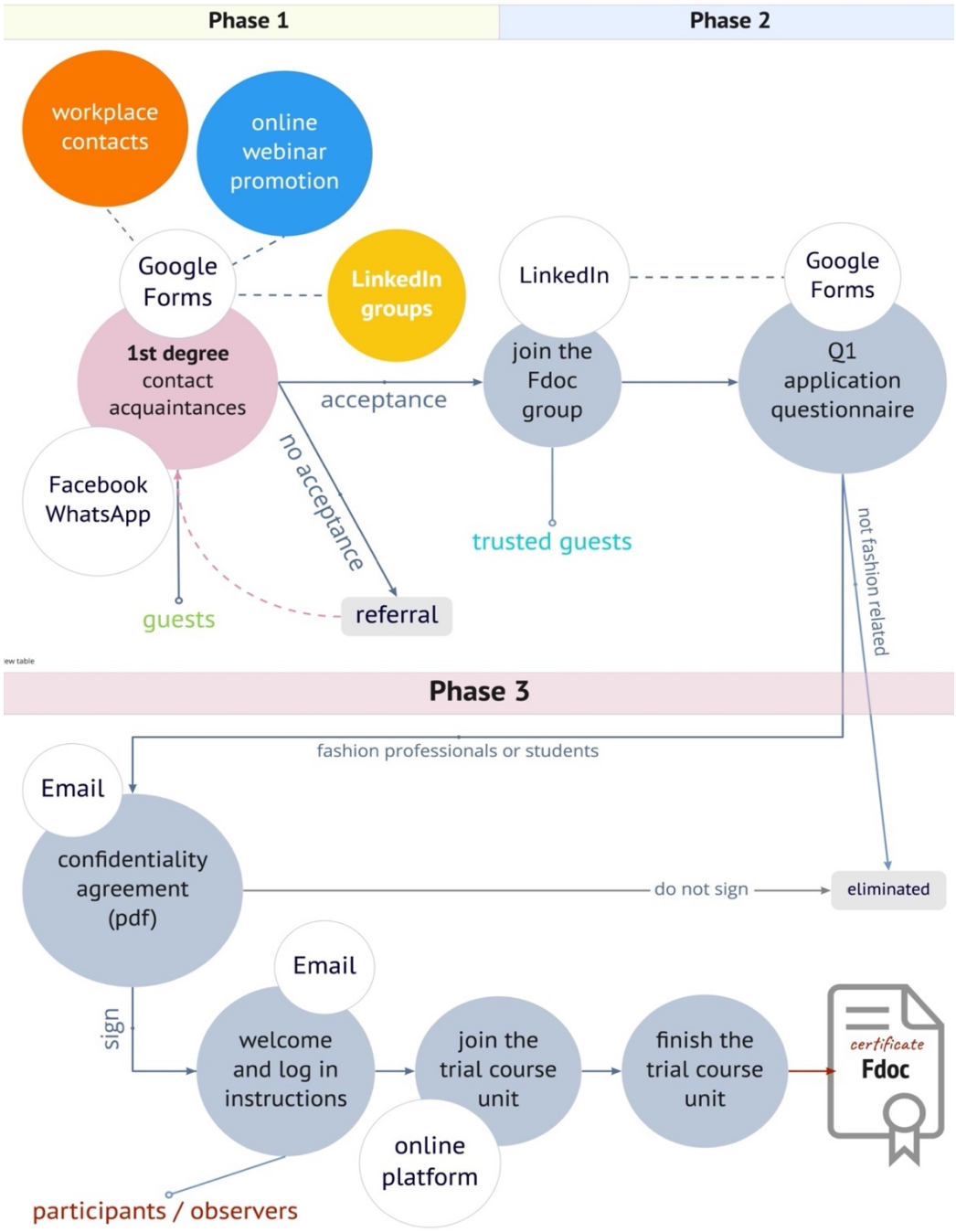


Figure D1 sampling protocol

Phases of the sampling protocol

Phase one - 'guest invitation' using Google Form: first-degree contacts, through social networking.

a) The reasons they to invite them to join the research project.
b) Brief description of the research, with overall information and its importance for the fashion sector.
c) Commitment expected as learners, time frame. Invitation to FDOC *research group* in LinkedIn. Request the contact of at least one person with a similar profile.
d) Confidentiality and Privacy statement (data protection, anonymity, content, and outcomes).

Phase 2 - trusted guests (second-degree contacts), joined the LinkedIn group and responded to the *Q1_application questionnaire*. By signing the Confidentiality Agreement, they became participants/observers[96], activating the Phase 3:

a) Welcome email with login information for Google Classroom, Moodle LMS or Thinkific, and an instructional video.
b) Detailed description and goals of the trial course unit and required commitment with the research.
c) Mode of delivery of the trial course unit, start and end dates with flexible schedule, workload, and course plan.

Figure D2 - the sampling schedule

[96] Participants - people committed to join and complete the trial course unit as learners. Observers joined the trial course unit, providing opinion about the learning design and the learning environment, in accordance with their expertise (e.g. graphic designer, UX designer, etc.). Respondents were people that answered *Q1_questionnaire* but did not enrol in the trial course unit, or that enrolled and withdrew.

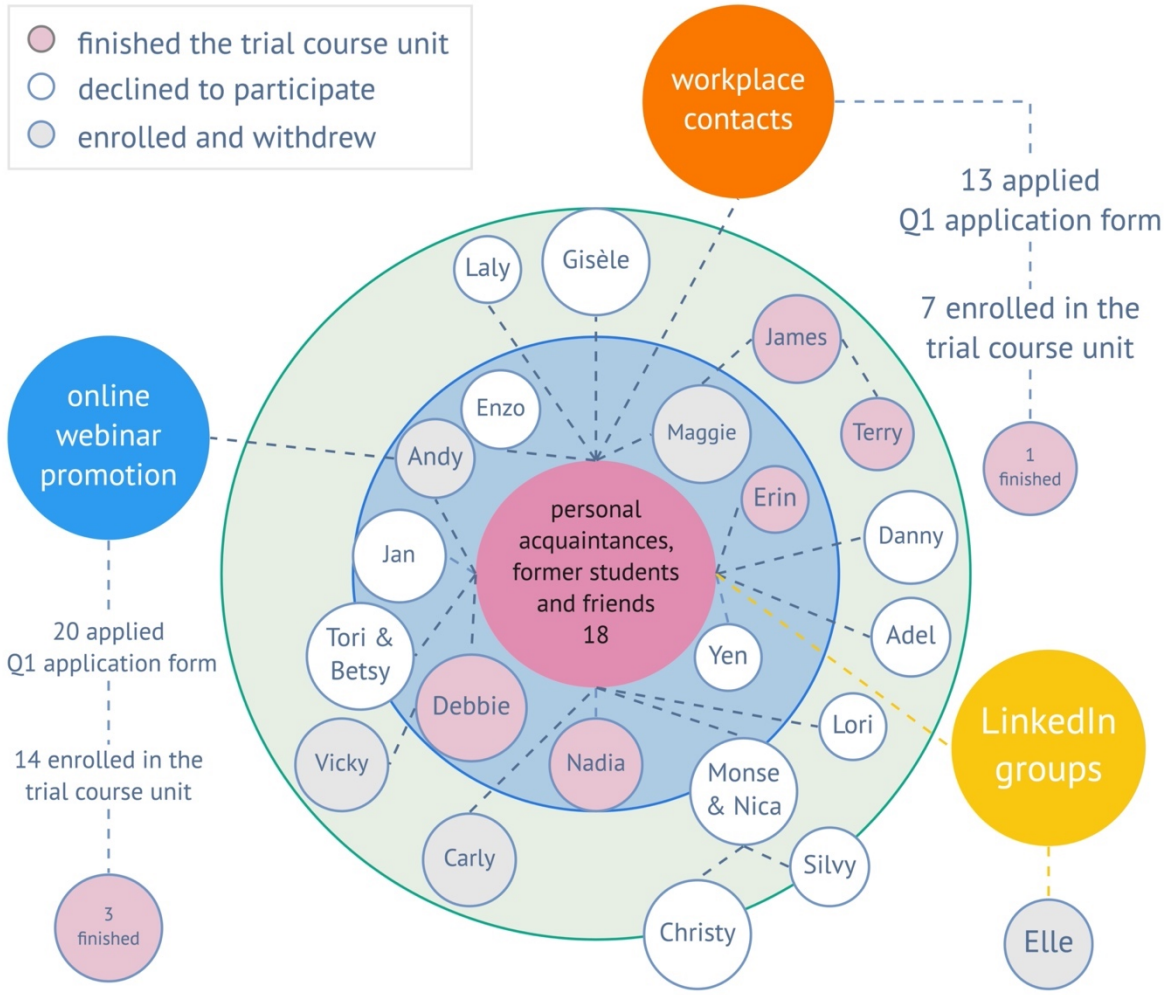


Figure D3 snowball technique through the researcher network.

APPENDIX E

Qualitative methods of data collection

Table E1 concepts adopted

Competence learning	Teacher-centred approach; the acquisition of knowledge and skills to meet defined learning outcomes of a course or program.
Capability	Learner-centred approach; the development of autonomy, capacity to apply the competences in new situations, after the course or program.
FDLP	Fashion design learning principles, synthesised the theoretical framework and guided the development of the model COL4FASHION.
COL4fashion	Collaborative, online learning model for fashion design.
FDOC	Fashion design online collaborative course, the typology of the course unit used to test the model.
Personalised Learning Agreement (PLA)	Personalised Learning Agreement, a subcomponent of the Learning Contract.
Learning Contract	Course unit document and a component of the model (LC), similar with a unit descriptor, with negotiable terms.
Learning goals and objectives	The aims of the teacher, program, or institution.
Learning Outcomes	"what students will be able to know or do after complete a course successfully" Under the COL4FASHION perspective, learners can negotiate them.
Learning components	The main components of the model: Learning Discovery (LD), Learning Contract (LC) and Learning Experience (LC).
Learning subcomponents	The complementary components of the model: Learner-centred (L-ce), Learning community (L-co), Learning Assessment (La) and Learning Outcomes (Lo)

Table E2 problem management plan

problem	possible solution
Technical issues with the platform	Implement the trial course unit on two different platforms
Participants have difficulty in using the suggested tools to develop the assignments.	Allow them to use the tools they are more familiarised with.
Participants have difficulty in understanding the learning model.	Create a Manifesto about the model. Create tables with the assignments and deliverables. Schedule individual synchronous meetings to clarify doubts.
No participants for the research or participants withdraw.	Select more participants during the sampling, to ensure that eight participants finish the trial course. Invite the researcher students to join, since they are already studying online due to the Covid-19 pandemic lockdown.
Participants wanting to be paid to collaborate.	Issue, instead, a certificate of participation and communicate the relevance of participating in an academic study.
Disagreement among participants.	Schedule synchronous meetings (individual and group).
Loss of essential data and information for the research.	Use at least two different instruments for each method of data collection.

Outlining the research prototype

Table E3 Specifications for the trial course unit as a research prototype.

Why	Test the model COL4FASHION and its learning components: Learning discovery (LD), Learning Contract (LC) and Learning experience (LE).	
What	Title	*Fashion trends fundamentals for fashion design collections*
Where / When	Timeframe	4-8 weeks. Maximum of 12 weeks. Finish the trial course unit until January 2021.
	Delivery mode	100% online
	Online Learning Environment	Open-source platform LMS Moodle and Thinkific, online course platform.
	Language	English
	Information storage	• Moodle backlog and Thinkific storage. • Screen recordings of group/individual meetings and live presentations.
Who	Participants/ Learners	Fashion design professionals and students. Complete the course unit, engaging with the activities and with the learning community. Provide feedback and evaluate the learning experience.
	Staff	Andreana Buest, PhD student. As researcher: course unit development, implementation, activation, sampling, observation, data collection, and analysis. As PLM: support participants tutoring during; improve the trial course unit.
		Doutora Maria da Graça Guedes, PhD supervisor Scientific Board Member of the Doctoral Program in Fashion Design Assist and support the research project so it respects the academic research standards.
		At LSM Moodle, manager of the partner company manager. Provide and maintain platform access. Passive participation to monitor and preserve the company's information and interests.
How	Syllabus	• Organised in five parts: Discover (assignments), Define (content and assignments), Develop (assignments), Demonstrate (assessment), Deliver (outcomes). • Content: Fashion design project, focus on collection planning and structuring, divided into video lessons.
	Resources, software, digital tools	Video lessons in PowerPoint and voice recording. Assignments on the platform. Forums, discussion chats. Documents in PDF. Google forms for questionnaires and quizzes.
	Communication and promotion	Facebook and LinkedIn. Google email account created for the trial course unit. YouTube account created for the trial course unit.
	Important documents	• Before starting the trial course unit: Q1_application form; Confidentiality Agreement. • Embedded within the trial course unit: Learning Contract and the Personalised Learning Agreement (PLA), Manifesto, Self-diagnosis, Self-scoring, Assignments and Deliverables. • After the trial course unit: *Q7_evaluation form;* Certificate of participation.
	Incentives to participants	Collaborate in a research project within the fashion design area. Networking opportunities. Certificate of participation.

Table E4 Research questions indicators

RQ	indicators coding	What to observe: evidence of...	Fashion design learning principles (FDLP)
RQ1 Collaborative Learning	q1_1 contextualised, constructed learning	real-life situations brought into the learning assignments, outputs. how much/the level that the professional sector approached LE and vice-versa.	*Research & Interpretation*
	q1_2 learning community and extended community	multiple learning partners and different perspectives. how much/the level that the community impacted the individual or group learning experience.	*Collaboration & Communication*
	q1_3 co-learning	shared creation/creativity (expertise, resources, values, ideas). how much/the level that learners learned from each other. how much/the level that learners explored together the learning content (LCo). and the online learning experience (O-LE).	
	q1_4 critical FB/FF triggering reflective thinking	questioning and reflection due to feedback / feed-forward. how much/the level that FB/FF impacted the learning experience (LE). how much/the level that reflective discussions took place.	*Reflective Thinking*
RQ2 Prospective Learning	q2_1 deep learning and understanding	emergent thinking surfacing in complex problem-solving situations. how much/the level of continuous high-level questions (inquiry-based learning). how much/the level that learning experience (LE) promoted collaboration, and self-sufficiency.	
	q2_2 double-loop learning	reflective thinking and self-reflection impacting learner's mindset. how much/the level that the LE challenged learners' values and assumptions.	*Complexity & Uncertainty*
	q2_3 non-linear learning	flexible incremental and exponential learning. how much/the level that learners surpassed or "branched-out" the content. how much/the level that learners extrapolated fashion expected, and specific competencies.	
RQ3 Personalised Learning	q3_1 learner-centred	self-development, lifelong learning. how much/the level that learners took responsibility for their learning, evidencing autonomy and human agency. how much/the level that learners acknowledged their own learning needs and negotiate them responsibly.	*Creativity & Imagination*
	q3_2 self-determined and capability-based learning	prospective thinking. how much/the level that learner's previously acquired competencies applied to new challenges. how much/the level of individual and meaningful pathways emerging.	

APPENDIX F

Instruments of indirect observation, the questionnaires, quizzes, and assignments

Table F1 Assignments and Deliverables of the five parts of the trial course unit

		Estimated total of scheduled activity at the online platform: 24hs		
DISCOVER	*Estimated time to complete: 1-2 weeks* *Goals: introduce the course unit, the learning community; negotiate the Personalised Learning Agreement*			
	Topic title	Assignments		
Course Unit Overview (D1P1)		*Course unit documents*	D1P1.1	
FashionUs (D1P2)		*Self-Diagnosis* *Breaking the ice* *Fashion Network Map (optional)*	D1P2.1 D1P2.2 D1P2.3	
Online Group Meeting (D1P3)		*Group Meeting* *Question about the Group Meeting*	D1P3.1 D1P3.2	
WeFashion (D1P4)		*Fashion Circle (optional)* *Fashion perspective/prospective (optional)* *Glocal Fashion (optional)*	D1P4.1 D1P4.2 D1P4.3	
FashionMe (D1P5)		*My Fashion Brief* *Future in/for Fashion* *Individual Meeting* *Question about the Individual Meeting*	D1P5.1 D1P5.2 D1P5.3 D1P5.4	
Learning Agreement (D1P6)		*Personalised Learning Agreement (PLA)*	D1P6.1	
DEFINE Unit Content	*Estimated time to complete: 1-2 weeks* *Goals: to access and reflect on the content; define the brand and the target market.*			
	Topic title	Content	Course materials and resources	
Unit Content (D2P1)		*Fashion design collections* *Fashion design collection boards* *Analysis of previous collections* *The Brand* *Market segmentation perspectives* *Fashion trends*	**D2P1.1FC** D2P1.1FCb D2P1.1an **D2P1.2B** D2P1.3m **D2P1.4FT**	
Reflective question (D2P2)		*Reflective Question (parts 1 and 2)*	D2P2.1	
DEFINE Assignments	Topic title	Assignments	Course materials and resources	Deliverable
About the brand (D3P1)		*Brand identity, definition* *Brand's key collections* *Brand board* peer feedback/feedforward	D3P1.1 D3P1.2 D3P1.3	D8_3

About the market (D3P2)	*Brand's consumer definition* *Target audience board* peer feedback/feedforward	D3P2.1	D8_2

DEVELOP	*Estimated time to complete: 2-3 weeks.* *Goal: plan and structure a fashion design collection or project, applying fashion trends elements, aligned with the brand.*			
	Topic title	Assignments	Course materials and resources	Deliverable
Fashion trends, applied to a new collection (D4P1)		*Fashion trends research.* *Creative brief: Fashion trends for a fashion brand* peer feedback/feedforward	D4P1.1 D4P1.2	D8_1 D8_4 (D8_4.1)
Planning and structuring a Fashion design collection (D56P1)		*Concept, theme, mood board* *Wear* *Colours and materials, (and boards)* *Pieces of clothing and outfits* peer feedback/feedforward	D56P1.1 D56P1.2 D56P1.3 D56P1.4	D8_4 (D8_4.2)

DEMONSTRATE	*Estimated time to complete: 1 week.* *Goal: show initial results and activities outputs to the learning community; receive and give feedback*			
	Topic title	Assignments	Course materials and resources	Deliverable
Fashion design project, initial results. (D7P1)		*Fashion design project - present initial results.*	D7P1.1	D8_4 (D8_4.1 or D8_4.2)
		Feedback/feedforward report	D7P1.2	
Self-reflection (D7P2)		*Reflective Learning Journal - records*	D7P2.1	D8_5
		'PLA calibration' (individual meeting - optional) *Self-scoring*	D7P2.2 D7P2.3	

DELIVER	*Estimated time to complete: 1 week or less* *Goal: live presentation and final delivery*		
	Topic title	Assignments	Final Deliverables
Live presentation and delivery (D8)		*Live presentation (or recording)*	D8_6
		Self-assessment: 'PLA calibration'	D8_5
		Fashion design project - submit results, including outputs from D8_1, D8_2 and D8_3	D8_4 (D8_4.1 or D8_4.2)

Table F2 Characterisation of the questionnaires and quizzes (Q)

Before the course unit	Discover	Define	Develop	Demonstrate	Deliver	After the course unit
Q1_ application form	D1P1_question about the course unit documents (platform)	D2P2 Reflective Question (platform)	FB/FF on assignments (D456P1)	D7P2.3_self scoring	Q6_question about Deliver assignments	Q7_course unit evaluation
	D1P2.1_Self diagnosis	FB/FF on assignments (D3P1 and D3P2)	Q4_question about Develop - assignments	D7P1.2_Final FB/FF		
	D1P3.2_question about the Group Meeting (platform)	Q3.1_question about Define - content		Q5_question about Demonstrate - assignments		
	D1P5.4_question about the Individual Meeting (platform)	Q3.2_question about Define - assignments				
	D1P6_PLA					
	Q2_question about Discover					

Questionnaires

Questionnaire's breakdown:

- *Q1_application form*, had three categories of questions:

Six questions related to general information about participant's experience in the trial course unit. Eight questions focused on participant's opinion about the model COL4FASHION in general. Six questions to know if participants recognised evidence of the research questions (RQ1, RQ2 and RQ3).

The questionnaire main goal was to collect qualitative data and reveal participants' profile, their background in the fashion sector, their perspectives on online learning in the fashion design field. It also provided qualitative information to be compared with participants' engagement during the course unit.

- The *D1P2.1_Self Diagnosis* questionnaire helped participants to acknowledge acquired competencies to be applied to the trial course unit in the development of their projects.
- The *D1P6_Personalised Learning Agreement* (PLA) questionnaire, organised in four (4) sections and twenty (20) questions (five were confirmation or submission questions, non-mandatory), negotiated the components of the collaborative online learning model.
- *Feedback/Feed-forward forms (FB_FF)* used dichotomous scales (Yes and No), five-point bipolar scales (linear scale in Google Forms) and grid questions (checkbox grid in Google Forms). Participants chose one learner to assess and compared the requirements of the assignment with the level of completion. The 'feed-forward' used open questions to collect participant's suggestions.
- In the *D7P2.3 self-scoring,* participants assessed their own learning path. Organised in five (5) sections, it related to the deliverables and used multiple choice, grid questions (checkbox grid in Google Forms), dichotomous scale (Yes and No), open questions (short answers or paragraphs in Google Forms), five-point bipolar scale (linear scale in Google Forms). It distributed the list of assignments in the rows[97], while the scale (with the "grades") in the columns. Participants needed to score each assignment.

[97] In the rows, some options related to the research questions indicators: "share it with the learning community" (q1_2), "provide feedback to a classmate" and "include it in the reflective journal" (q1_4).

- *Q7_course unit evaluation* aimed to understand the perceptions of the participants about the learning model, the learning experience, and the possibility of online learning models for the fashion design education. The results of this questionnaire triangulated with the analysis of results (Chapter 5).

Quizzes' breakdown:

- Four questions, included directly in the platform, resorted to five-point unipolar or bipolar scale to verify, and incentivise participants to consult the course unit documents and the learning content, to opine about the meetings and how they influenced the learning experience.
- Quizzes Q2-Q5 ('_question about'), placed at the end of each part of the trial course unit, had one grid question collecting participant's perceptions about the research questions indicators on each part of the trial course unit[98]. The results from quizzes, triangulated with the participant's completion, the questionnaires responses and with the evidence identified in the analysis by the researcher. The quiz "Q6_question about Deliver assignments" presented two questions to measure the level of satisfaction participants had with deliverables in relation to the negotiated outcomes. It also collected comments or suggestions related to the trial course unit.

Table F3 Characterisation of the Meetings (M)

Discover	Demonstrate	Deliver
D1P3.1_Group Meeting	D7P2.2_'PLA calibration' meeting with the PLM	D8_6: Live presentation and delivery.
D1P5.3_Individual Meeting		

[98] "*Which capabilities (columns) were triggered by the following assignments (rows)?*" The capabilities (in the columns) related to the research questions indicators. In the list of assignments (in the rows), participants 'checked' different 'capabilities', indicating that the assignment triggered that indicator. One extra option: '*No capabilities were triggered in this assignment*', informed if participants did not relate the assignment with any indicators.

APPENDIX G

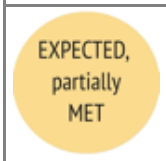
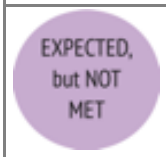
Figure G1 Focus Group sample - activity board

APPENDIX H

Table H1 Analytical Matrix (AM)

Learning Components/ subcomponents	Research Questions	RQ1 collaborative learning				RQ2 prospective learning			RQ3 personalised learning		Total n° expected indicators
	Indicators of the research questions	q1_1	q1_2	q1_3	q1_4	q2_1	q2_2	q2_3	q3_1	q3_2	
Learning Discovery (LD)											
Learning Community	D1P2.2_ Breaking the ice										4
	D1P3.1_Group Meeting										5
	D1P3.2_question about the Group Meeting										3
Learner-centred	D1P2.1_ Self Diagnosis (SD) with the motivation letter (submission)										4
	D1P5.3_Individual Meeting										4
	D1P5.4_question about Individual Meeting										4
Q2_about Discover											9
Learning Contract (LC)											
	D1P1.1_question about the course unit documents										4
D1P6.1_Personalised Learning Agreement (PLA)											5
Learning Experience (LE)											
Subcomponents: Online Learning Experience (o-LE) Collaborative Learning Experience (c-LE)	D3P1.1_Brand Identity definition D3P1.2_Brand key collections D3P1.3_Brand board D3P2.1_Brand's consumer (and target board)										3
	D4P1.1_Fashion trends sources D4P1.2_Fashion trends for a fashion brand (brief)										54

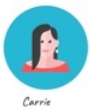
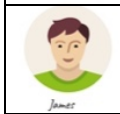
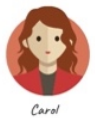
Table H2 Parameters of QAMs

Label	Indicators being triggered by the QAM	Q	A
	description	Number of answers related to each indicator identified.	Level of Completion of the Assignment
	indicators EXPECTED and MET	=>50% of the answers	Completed
	indicators NOT EXPECTED but MET		
	indicators EXPECTED and partially MET	>=40% of the answers	Partially completed
	indicators EXPECTED but NOT MET	<40% of the answers	Not completed
	Did not trigger any indicators	——	——

APPENDIX I

The implementation of the fashion design online course (FDOC), the trial course unit

Table I1 Different scenarios of use considered the expected profiles of the participants (P1, P2, P3).

Profile / weighting system	Interaction with the FDOC activities
 P1/W2	complete Discover, review the content in Define (that they already know) and focus on activities on Define assignments, because they will Develop / Demonstrate focusing on their own brand and Deliver D8_1 trend study, D8_2 market study, and D8_3 brand study. Earn the certificate.
 P3/W2	complete Discover, review the content Define and follow activities of Define, Develop and Demonstrate, selecting their areas of interest, and completing the overall activities of the course with less depth and more width. Earn the certificate.
 P2/W3	complete Discover, review the content D2 (that they might or not know) and focus on their final projects as negotiated in the PLA, completing the activities of D3, looking at Define, and Develop, engaging in the group meeting and Deliver the final project. Earn the certificate.

Building scenarios helped identify and understand the activities participants would engage, allocate resources materials, and tools. It also helped mark the research questions indicators to the activities (participants - activities). The main purpose was to simulate the collaborative online learning experience, starting with the participants' enrolment, completing the activities, formation of a learning community and earning a certificate of participation at the end. Since participants had three profiles, then at least three scenarios would represent their profile, which implicated different learning outcomes. Nevertheless, all profiles started with the course unit enrolment and had the same goals:

- Accept and sign the Confidentiality Agreement before accessing the five parts of the FDOC.
- Introduce themselves to the learning community.
- Complete the activities in the Discover part, before starting the next part.
- Negotiate the PLA, at the end of the Discover part.
- Respond to all quizzes and questionnaires.
- Join the group meeting and individual meeting (to validate the PLA).
- Complete all the activities of the five parts of the course unit, coherent with the negotiation of the PLA.
- Develop the Reflective Learning Journal.
- Submit the deliverables, as negotiated in the PLA.
- Receive the certificate of participation.

Table I2 Workload defined for the fashion design collaborative online course (FDOC)

UK Credit Value	EHEA Credit Value	FDOC workload distribution
10 cr 1cr = 10hs 10cr = 100hs	EQF system 4cr 1cr = 25hs 4cr = 100hs	8 weeks 100hs = 24hs contact hours + 76hs independent study Weekly distribution 12h30 / week 3hs contact hours 9h30 of independent study

The workload considered the minimum credit value awarded by the independent course units offered at the University of Minho, following the European system (EQF) and the British system (QAA, 2008)[99] adopted by the in educational institution supporting this research. The KIS[100] categories helped to devise the type of activities allocated for the FDOC course unit, under the defined workload. In the Learning Contract, the workload was not negotiable.

- Scheduled Activities (SA) - contact hours learners needed to spend in synchronous or asynchronous contact with the learning community (PLM guidance and project support, individual and group meetings) and with the online platform, consulting the content and resources (video lessons, webinars, pre-recorded presentation, tutorials, lectures, image banks, texts, forums), experimenting with the tools, solving the activities, engaging on formative assessment (not in summative assessment).
- Independent Study (IS) - number of hours learners needed to spend in independent learning, self-directed study, resolving the activities, preparing for the meetings, researching.

[99] The course unit designation followed in QAA (quality assurance agency, p.1), as a block unit.

[100] Calculation of assessment methods and learning and teaching methods | HESA

Table I3 fashion design technology-based tools used in FDOC

Model COL4FASHION		Online Learning Experience (o-LE) subcomponent	
Fashion design learning principles (FDLP)	semiotic 'states' of fashion design	Technology-based tools recommendations	implemented in FDOC
Collaboration & Communication	encoding - decoding process (communication)	Collaborative and contextualised design	• Google Suite or Microsoft Office • Milanote, Miro, MindMup2.0 • Joomag, Flipsnack, Blogger, Day One • Tayasui Sketches, Microsoft Paint 3D, CLO 3D fashion • Trello (Asana) • LinkedIn, Instagram / Facebook, Youtube
Research & Interpretation		Reflective and craft-based design	
Reflective Thinking	reflective process (imaginative)		
Creativity & Imagination	prospective process (anticipative)	Prospective, open design	
Complexity & Uncertainty	uncertain process (open)		

Gmail PhD4Fashion research project <phd4fashion@gmail.com>

Fashion course unit starting (information)

PhD4Fashion research project <phd4fashion@gmail.com> 12 February 2022 at 11:07
Draft

---------- Forwarded message ---------
From: **PhD4Fashion research project** <phd4fashion@gmail.com>
Date: Wed, 18 Nov 2020 at 15:39
Subject: Fashion course unit starting (information)
To:

Dear ,

Welcome to 'Fashion trends, fundamentals of fashion design collections'.

First of all, I want to thank you for supporting this research project. I appreciate your interest in participating in this trial course unit, providing your opinions and feedback. Also, I hope the learning experience meets your personal or professional expectations and that we can learn together.
I will be the research observer and also your tutor throughout the course unit and you can contact me by email or Google Hangout.

The course unit will open on November 21st, but you can register and enrol now.
1. Go to the Thinkific Online Platform.
2. Create an account to be enrolled in the course unit.
3. To get familiar with the online environment, I invite you to start:

- View the instructional video, also available in the 'Dashboard';
- Consult 'Course Unit - the 5 parts'
- Complete the 'D1P2.1_Self Diagnosis, Quiz'

During the registration, you will be asked to read and accept the Privacy Policy and Terms of Use, with information about data protection for the research and the participants, during the trial course.
If you have any questions about these terms, please let me know.

You are invited to the group meeting, scheduled for November 28th at 5pm (London Time) at Google Meets.
I take this opportunity to invite you to join the Fdoc research group in LinkedIn
--

Cordially,
Andreana Buest
my LinkedIn profile
Fdoc research group in LinkedIn
Enter the course

***

Confidentiality and Privacy Statement:

1. The information in this Email is completely confidential and proprietary to the research project and the researcher Andreana Buest. As such you must acknowledge the moral obligation not to use, share or disclose any information included in the Email message, with anyone other than the researcher and the other participants;
2. The researcher commits to respect the right to privacy and anonymity of all participants that accept to be part of the research.
3. All data (visual, written, or other) collected, shared and obtained during the email exchanges related to the research will remain anonymous, confidential and secure and will only be used by the researcher within the scope of the academic research.

Figure I1 - FDOC welcome email sample.

November 2020

Invitation to participate in a trial course unit:

f.doc
research project

Fashion trends, fundamentals of fashion design collections

University of Minho
School of Engineering

Centre for Textile Science and Technology
CENTRO DE CIÊNCIA E TECNOLOGIA TÊXTIL

This work is financed by Project UID/CTM/00264/2019 of 2C2T – Centro de Ciência e Tecnologia Têxtil, funded by National Funds through FCT/MCTES.

Hello

I am a PhD student at University of Minho, Portugal researching about models of learning for the fashion design sector.
If you are a fashion designers fashion student and fashion aficionado, I invite you to participate in a trial course unit delivered online.
The participation is free of costs and participants are expected to engage with the content, the assignments and learning community, providing feedback and evaluating the learning experience.
Your expertise will be very important for the research, so after completing the course, you will receive a certificate of participation.

How to participate:

1. Fill up the application form.
2. Register at the online platform.

- Starting date: November/December 2020.
- Duration: 5 – 8 weeks, depending on your availability.
- Content: fashion trends, fashion brands and fashion design collections.
- Learning environment: 100% online.
- Scheduled activities at the online platform: 24hs.
- Language: English.

Thank you!
Andreana Buest

Figure I2 - FDOC welcome email sample.

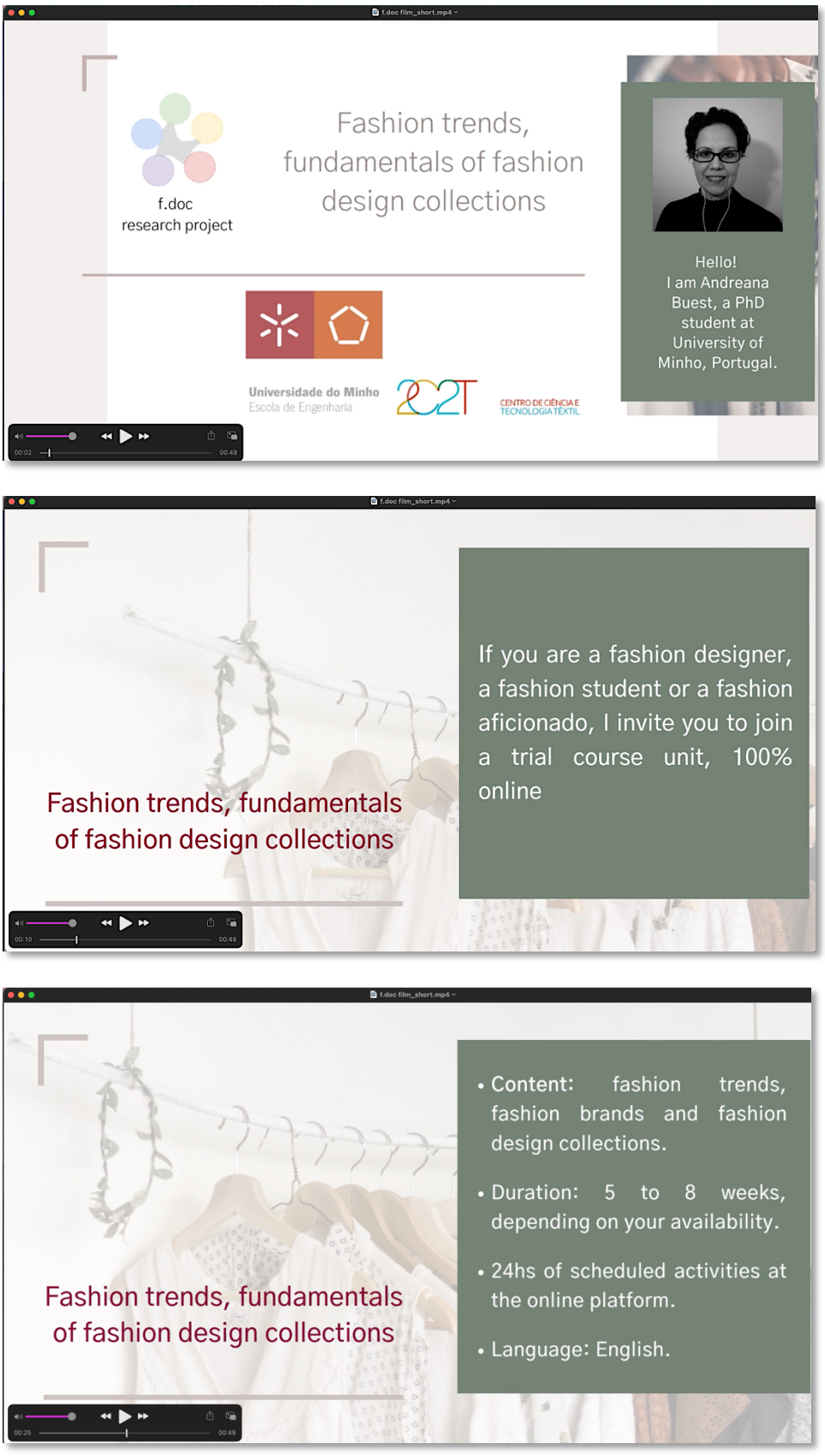


Figure I3 - Print screens of the promotional video, FDOC YouTube channel https://youtu.be/zL3Qrpmy1NM

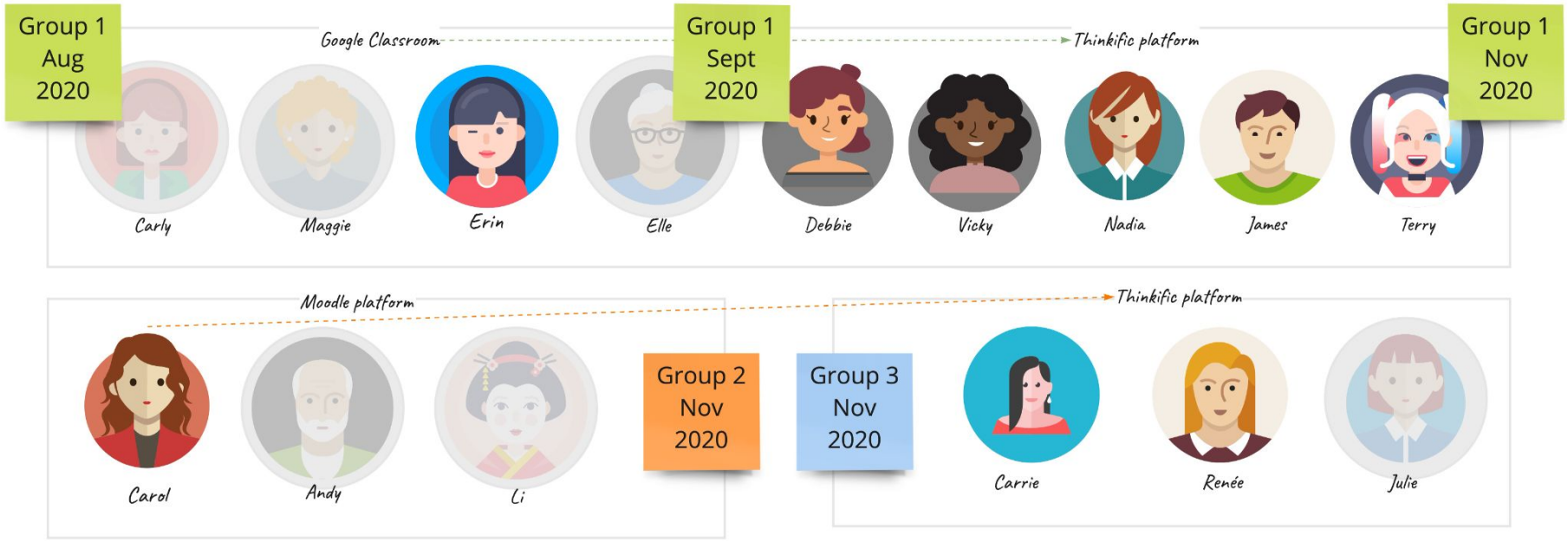


Figure I4 - fashion design online course (FDOC) enrolment and simulation period.

In Moodle LMS, sixteen (16) participants enrolled between November 4th and 11th, eight (8) from the 'researcher' direct contacts, five (5) by referral of former students, three (3) former students, but only one finished the course unit (Carol).
In Thinkific, twenty (20) people enrolled, and seven (7) participants finished (Carrie, Debbie, James, Joy, Nadia, Renée, and Terry).
Erin joined and audited both platforms, providing feedback.

APPENDIX J

Results from the Learning Components of the model COL4FASHION

Table J1 QAMs summary charting the Learning Discovery component (AM_LD).

Research Questions	RQ1 Collaborative Learning				RQ2 Prospective Learning			RQ3 Personalised Learning		[a]Summary of the analysis (QAMs)
QAM / indicators	q1_1	q1_2	q1_3	q1_4	q2_1	q2_2	q2_3	q3_1	q3_2	
Learning Community subcomponent										
D1P2.2_ Breaking the ice (expected indicators)										--------
[a]Evidence of the analysis										
[b]Q2_about the Discover										
D1P3.1_Group Meeting (expected indicators)										--------
[a]Evidence of the analysis										
[b]Q2_about the Discover										
D1P3.2_question about the Group Meeting (expected indicators)										--------
[a]Evidence of the analysis - Answer from the quiz (D1P3.2)										
	'Extremely and Very important' (> 50% of the answers)									
[a]Summary of the analysis LC indicators										
Final analysis subcomponent learning community [a+b]										
Learning centred subcomponent										
D1P2.1_ Self Diagnosis (SD) (expected indicators)										--------
Evidence of the analysis Answer from the quiz (D1P2.1)										
D1P5.3_Individual Meeting (expected indicators)										--------
Evidence of the analysis										
[b]Q2_about the Discover										
D1P5.4_question about Individual Meeting (expected indicators)										--------
Evidence of the analysis - Answer from the quiz (D1P5.4)										
[a]Summary of the analysis Lce indicators										

Table J2 QAMs summary charting the Learning Contract component (AM_LC).

Research Questions	RQ1 Collaborative Learning				RQ2 Prospective Learning			RQ3 Personalised Learning		Summary of the analysis (QAMs)
QAM / indicators	q1_1	q1_2	q1_3	q1_4	q2_1	q2_2	q2_3	q3_1	q3_2	
Personalised Learning Agreement (PLA) subcomponent										
D1P6.1_Personalised Learning Agreement, PLA (expected indicators)										-------
[a]Evidence of the analysis										
[b]Q2_about the Discover										
Summary of the analysis - PLA indicators										
Final analysis subcomponent PLA[a+b]										

Table J3 QAMs summary charting the Learning Experience component (AM_LE).

Research Questions	RQ1 Collaborative Learning				RQ2 Prospective Learning			RQ3 Personalised Learning		[a]Summary of the analysis (QAMs)	[a]Summary of the analysis (QAMs)
QAM / indicators	q1_1	q1_2	q1_3	q1_4	q2_1	q2_2	q2_3	q3_1	q3_2		
Online Learning Experience (O-LE) and Collaborative Learning Experience (C-LE)											
Define part, assignments (expected indicators)										-------	
[a]Evidence of the analysis											
[b]Q3_about Define											
Develop part, assignments (expected indicators)										-------	-------
[a]Evidence from the analysis											
[b]Q4_about Develop											
[a]Summary of the analysis - O-LE and C-LE indicators											
Final analysis subcomponents collaborative online learning experience [a+b]											
Learning Assessment (LA) and Learning Outcomes (LO)											
D7P1.1_Fashion collection, initial results (expected indicators)										-------	-------
[a]Evidence of the analysis											
D7P2.1 Records of virtual journals (expected indicators)										-------	-------
[a]Evidence of the analysis											
D7P2.3_ self-scoring (expected indicators)										-------	-------
[a]Evidence from the analysis											

APPENDIX K

Results from the Learning Discovery component

Figure K1 - Results breakdown - D1P2.2_Breaking the ice.

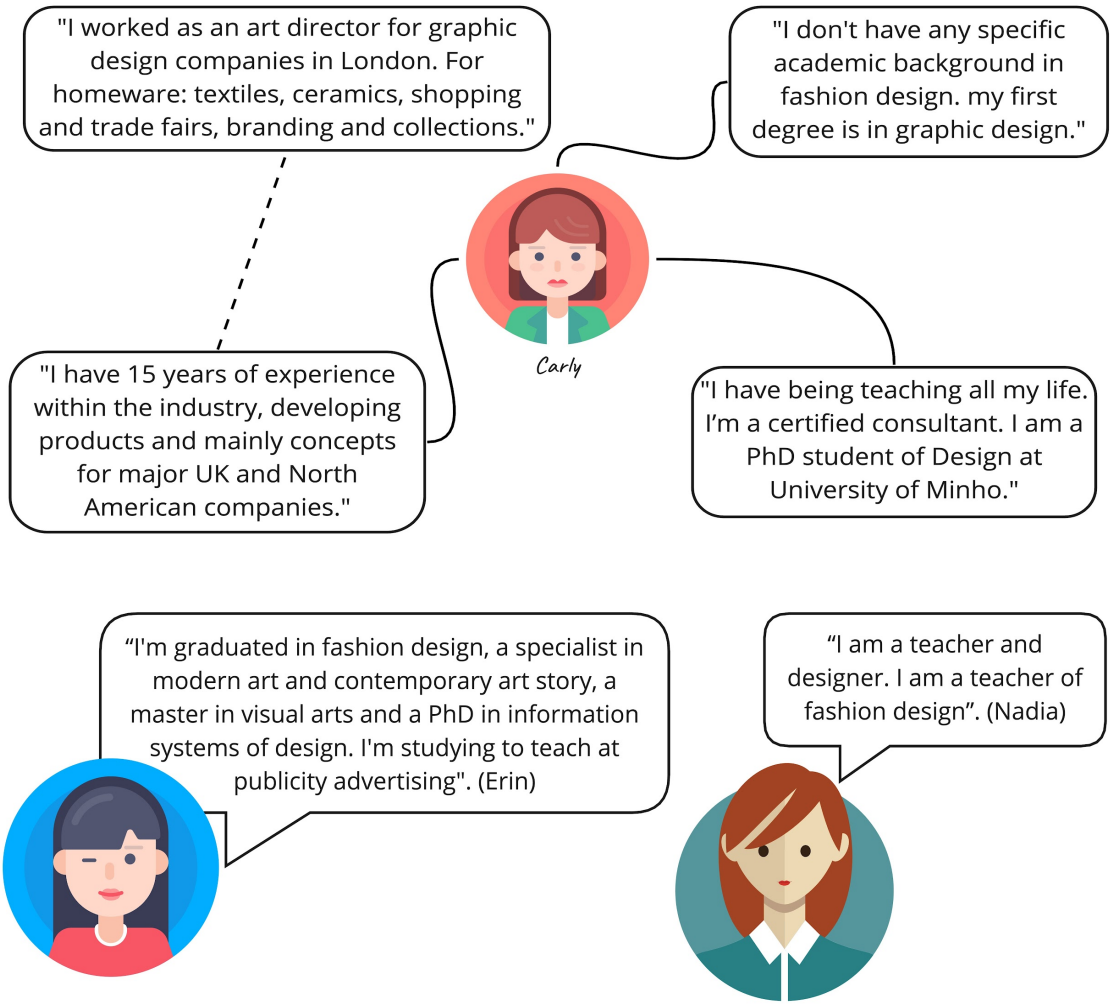


Figure K2 - Results breakdown - D1P3.1_Group Meeting

Table K1 D1P3.1_Group Meeting, transcriptions, and content analysis.

Expected indicators	Evidence in the participant's discourse
q1_2 learning community and extended community	"when you started talking here, in development... I find the proposal interesting if we work together, right? but mainly to guide, right? to have a guide, to know what I, within my stuff I can develop, right? So, I found the course proposal very interesting, I'm anxious." (Renée, G3N20). "I was browsing through the course and it is even more interesting than I thought before, and it will be useful for me at this time doing this project with you guys... share opinions and ideas. I really need to do the doctoral project, so... this would be a good way... (Carly, G1S20)
q1_3 co-learning	"Is it supposed for us to comment, comment on other people's work, and so, we'll be commenting on each other's work ? That's the main goal?" (Carly, G1S20) "So, no I... actually no, I don't have any idea right, I'm going now to see the material and see where I can fit in... I have a lot of question marks and let's see if I can fit this, this profile. Which is nothing like what I do today. Today I work with production. I'm the quality manager, so... it will be a 'let's see if it works for someone who doesn't really know'. So, I think it will be really cool..." (Carrie, G3N20)
q1_4 critical FB/FF triggering reflective thinking	
q2_2 double-loop learning	
q3_1 learner-centred	"I read it somewhere that we start this course all at the same time or each one in our, in their own work. Sorry if i missed it. do we have to start logging in together, one day all together no? If I can start Monday or Wednesday or next Thursday it's fine? We don't have to be all together, all the time no keep going? That sounds very good to me, that sounds good to me! That's, for me, it's brilliant!" (Carly, G1A20)
Unexpected indicators	**Evidence in the participant's discourse**
q1_1 contextualised, constructed learning	"So, I started to do it, to do this since September. I would like to shoot some, like, high quality videos to attract more fans, so that they will come to my live sales to buy clothes. I was grateful to have this chance to learn from you guys, because then I can maybe learn some, like, fashion designing or collection and so, maybe I think it will be useful for my videos." (Li, G2N20). "The theme of my (master) research was sustainable fashion focused in upcycling, so it was a great learning, and I'm very interested in and know more about this. I love fashion and all this kind of content is very nice and pleasure to me. Maybe the future... I'm doing at this time a collection of my brand, my hobby brand, slow fashion hobby brand and that I'm using the trash of the two past collections to make another one." (Carol, G2N20)
q3_2 self-determined capability-based learning	I have to do something for my own label as well. So, why not take this opportunity to share it with someone in a working project and we can

Table K2 Results breakdown - D1P2.1_Self-Diagnosis questionnaire

section	Question		Question option
Professional experience	SD-2	My level of professional experience in relation to:	• fashion collections • fashion trends research • fashion brands
Expectations for this course unit	SD-3	By completing this course unit, I expect:	• to understand more about trend analysis, theories, concepts, and methods. • to enhance/challenge my knowledge and skills, so I can translate it to the industry, to a brand, a collection. • to enrich my own portfolio. • to continue studying in the fashion field.
Learning style	SD-6	My learning style is:	• visual learner • verbal learner • logical learner • individual learner • aural learner • physical learner • social learner

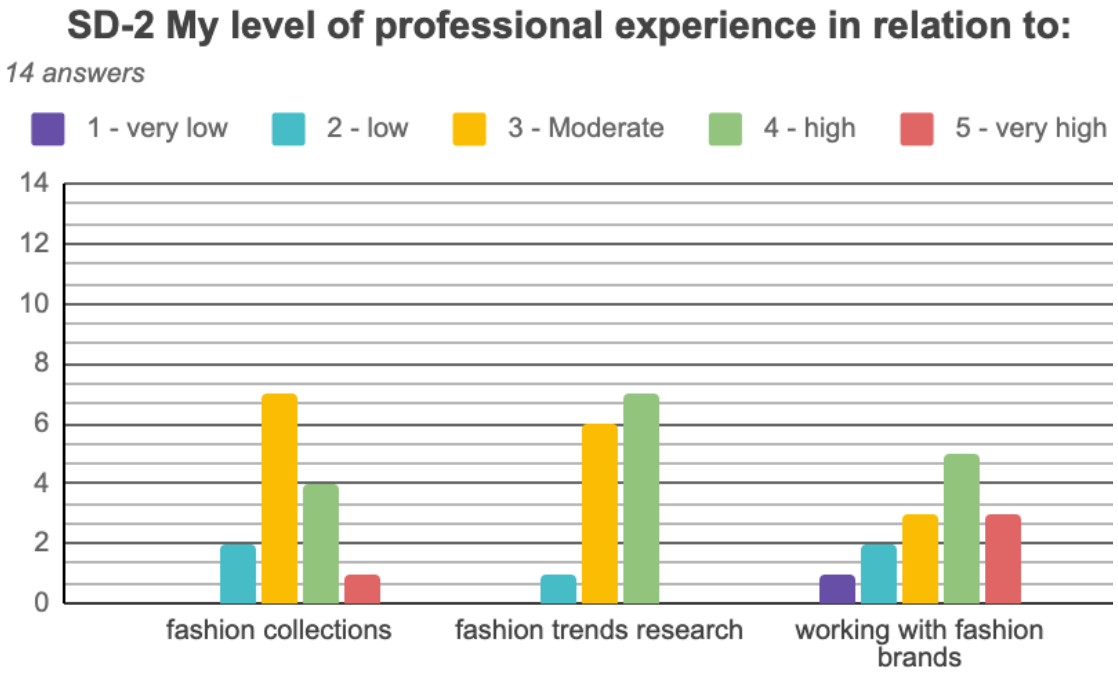


Figure K3 - SD Breakdown, professional experience about the course unit topics.

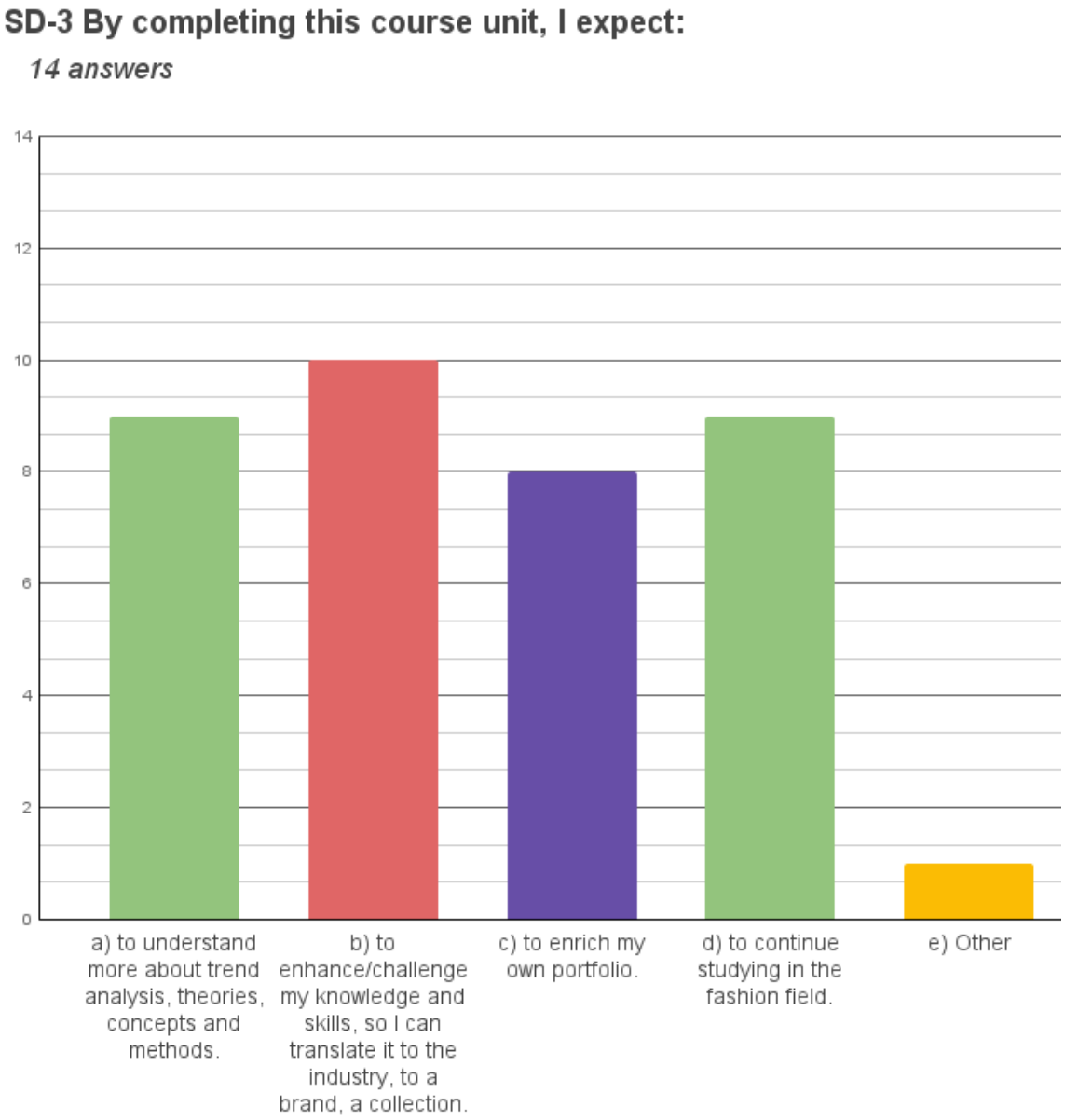


Figure K4 - SD Breakdown, expectations after completing the trial course.

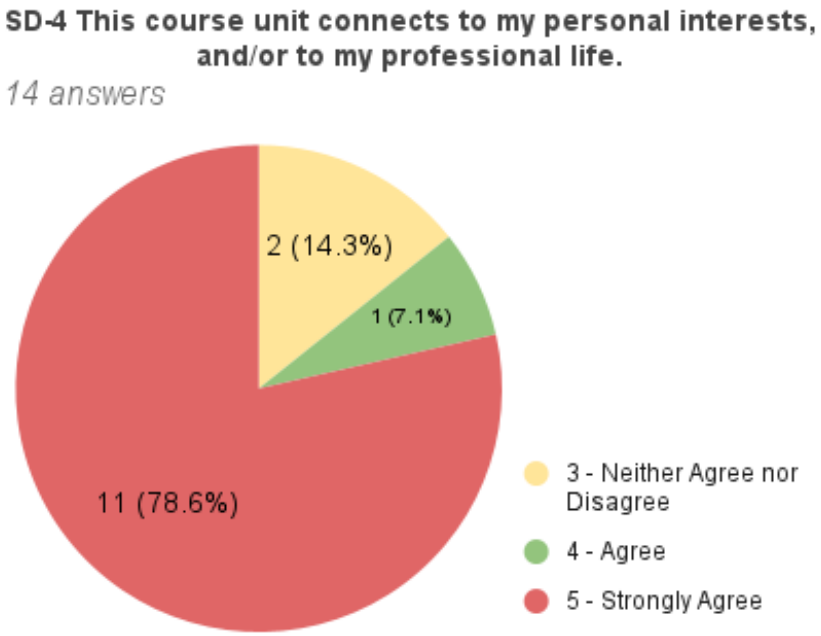


Figure K5 - SD Breakdown, course unit related to learner's profile.

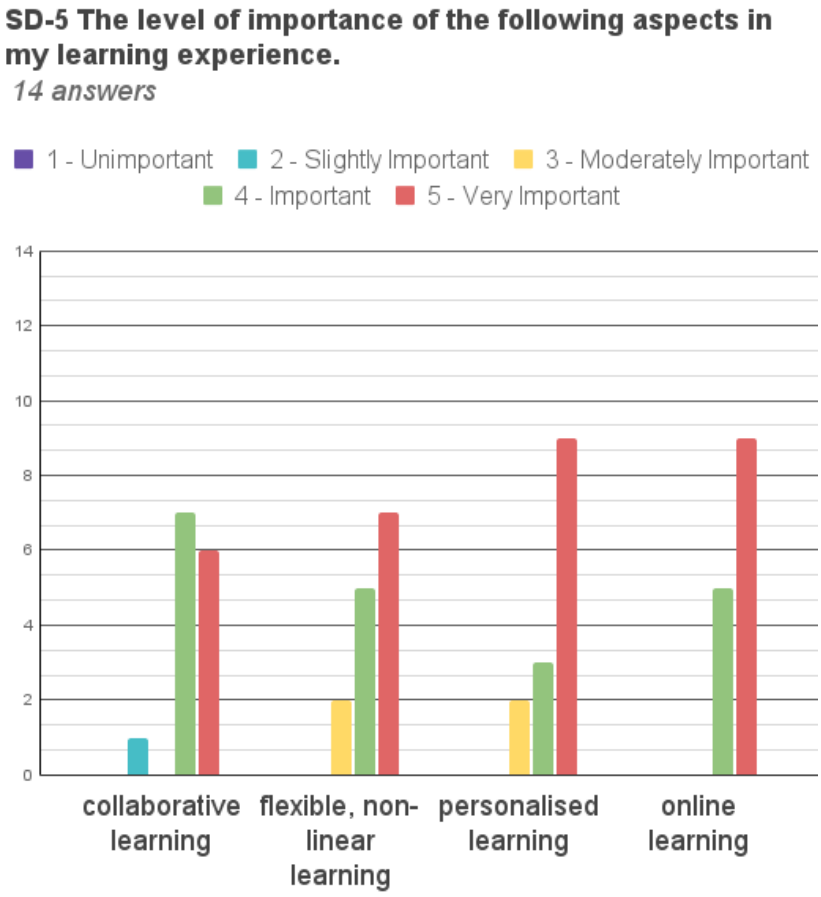


Figure K6 - SD Breakdown, important aspects of the trial course unit.

Table K3 Transcripts from the Motivation letters.

Expected indicators	Evidence in the motivation letters
q1_1 contextualised, constructed learning	I think that the online teaching method in fashion design can assist me in applied teaching for any study that requires phases and stages of project development. (Erin)
q2_3 non-linear learning	my main motivation to study more about fashion, brands and trends is to always keep myself updated and understand the changes in this area, which at the moment, is in transition due to changes in the world. (Nadia) the opportunity to be part of this research will help to update my knowledge in this segment and increase my network of contacts. (Vicky)
q3_1 Learner-centred	understand the moment I find myself in order to develop career transition strategies. I believe that the study can lead me to the path that I have the most congruence and affinity with. (Carrie)
q3_2 self-determined capability-based learning	at this time will be a great opportunity to exchange experiences and information in the context of fashion trends. My specific interest at this time is to go deeper into the study of trends and the process of building fashion collections (Carol)

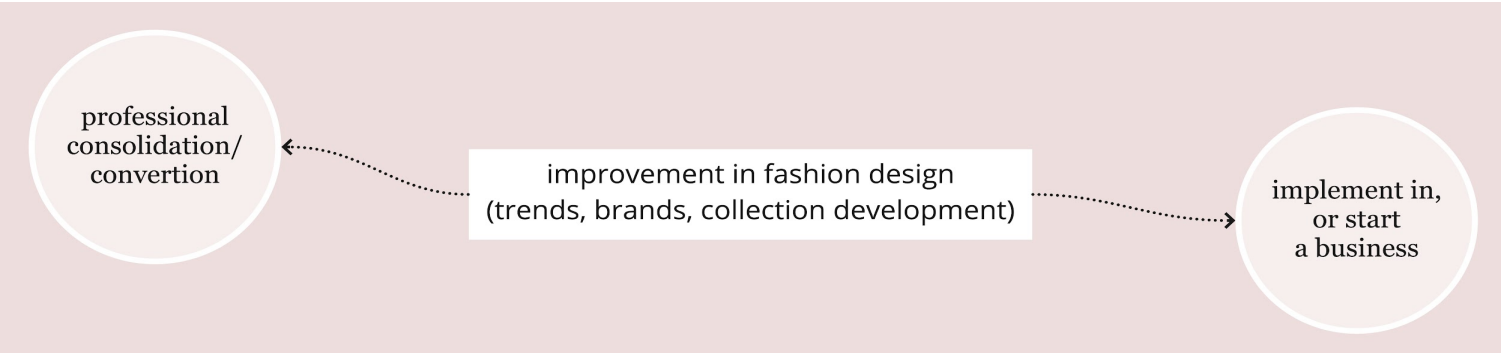


Figure K7 - Motivation letter, conceptual categories.

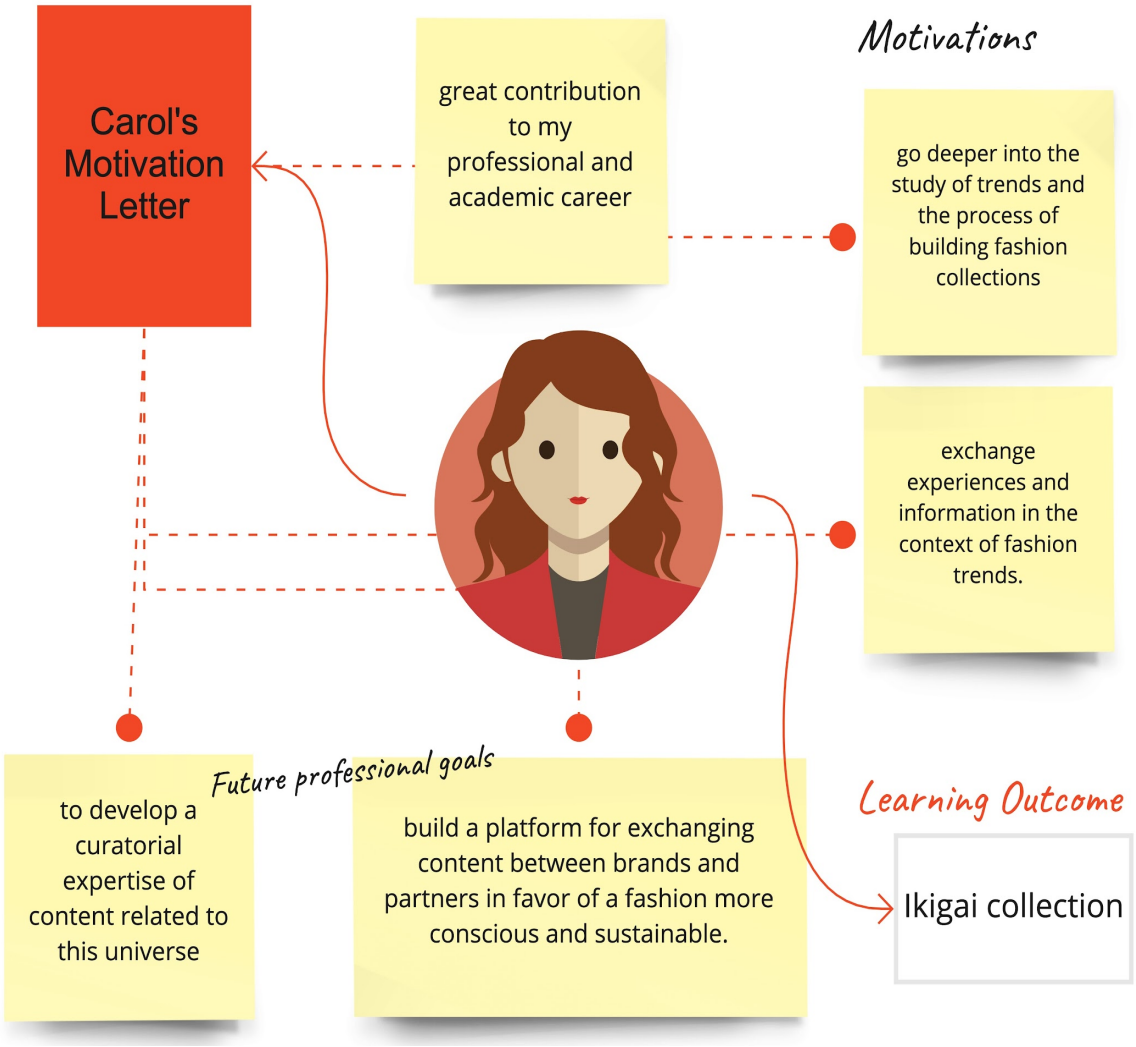


Figure K8 – Carol's motivation letter.

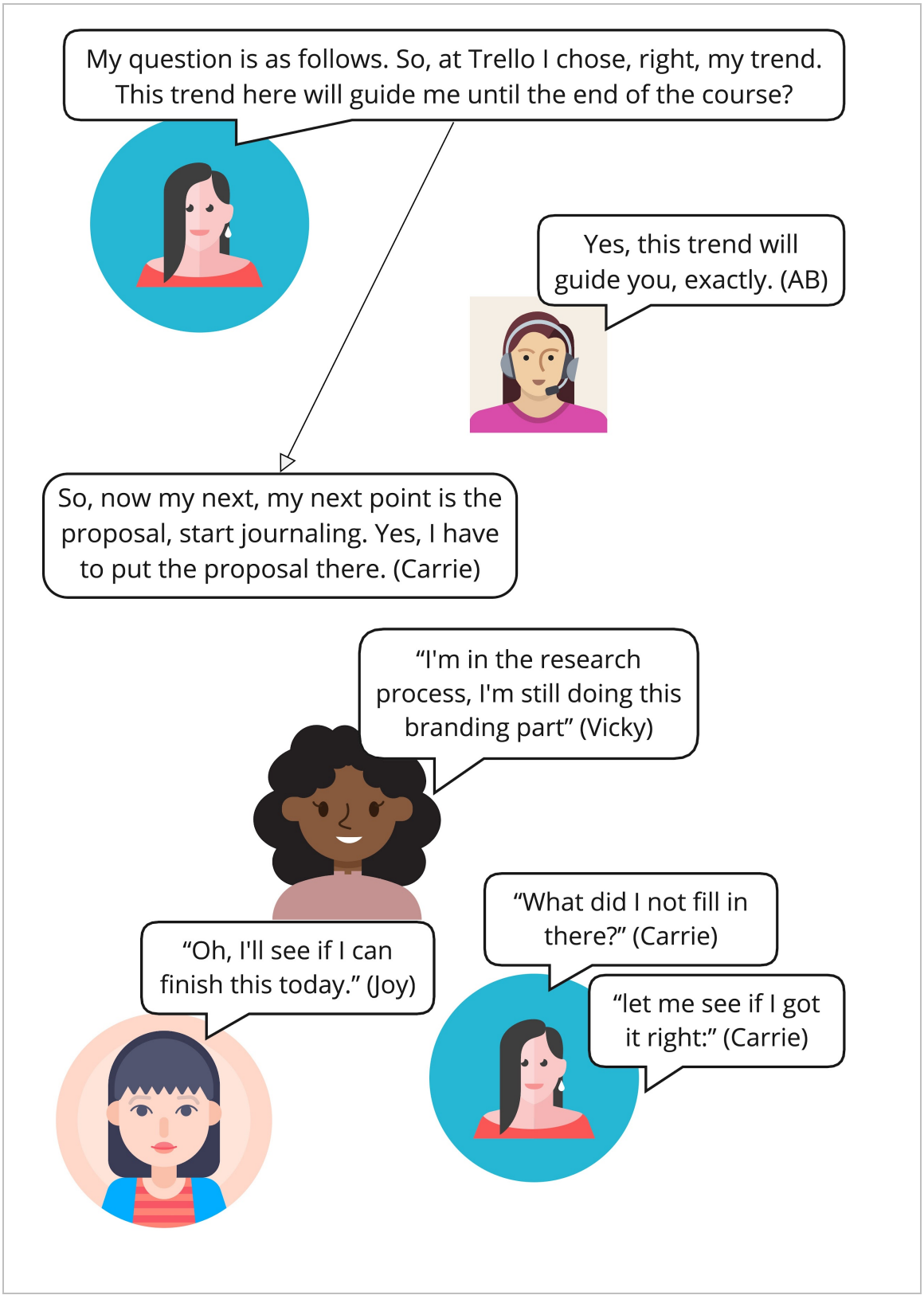


Figure K9 - Results from D1P5.3_Individual Meeting

Table K4 Transcriptions from the Individual Meetings

Expected indicators	Evidence in the participant's discourse
q1_1 contextualised, constructed learning	• And then in glocal fashion, I didn't understand the proposal. I have to put something that is happening here (in my region), but nothing relevant came to me. So that's what I was in doubt ... and based on the macrotrend, which we saw, one of those five, on the demographic issue of the planet, I felt a call to perhaps talk about this one, about the public over 50 and 60 years of age. So, my project right now is to develop a collection of three to five looks for women over 60 years old, making the outfits. Let's see if I can, inspired by the women around me. That's my intention. (Joy) • And when I was introduced to this course, I found it interesting to me because I think it's a way of knowing how I can promote my fashion photographic production brand. (Terry) • I believe it (the trial course unit) can help me now, to complete my (fashion) master's degree. It's about the luxury market, developing a strategic marketing plan for the luxury market. (Debbie) • That's right, it's called MR and it's been 'in the drawer' for too long and this course will help me structure the brand, the market, which however has also changed and I also have to look at things in a different way.(Carly) • Yes, I'm planning to start my first collection, then the course will help me a lot in this process.(Vicky)
q2_2 double-loop learning	• My intention to participate in this course... I hope to expand my knowledge a little. It's maybe even, I don't know, unblocking myself, getting out of the box a little, doing something I haven't done for some time, which is just thinking about other paths... made possible by, by the topics in the course.(Joy) • I'm at a stage in my life that I'm wanting to learn, I was very interested because I like this area of research. As a fashion designer... I'm already in this process of discovering myself.(Renée) • ... today I'm almost 40 years old and I've never worked with it, so how am I going to sell myself? I need to have something that I can say that I'm capable of and that I like and that I love and that I'm passionate about and you can bet on me, even if it's my first job in this field, you know? This is very doubtful for me today.(Carrie)
q3_1 learner-centred	• Okay, so my first idea would be this one, because I think it's time to try, here is where I will have the tools, right? (Carrie) • I have everything very clear and the directions are very clear and doing things step-by-step also helps to organize. The fact that everything is also very transparent and accessible, I navigate the assignments and themes, so it goes 'where I am and where I want to go', it is not a blind... where you do it every week, but you don't know what's going on next. I can walk and manage my time too. And now it's on my side, precisely with this perspective, to carry the work to the group discussions. (Carly)
q3_2 self-determined capability-based learning	• I'm joining this project by teacher Andreana, to be a motivation for me to finish my course, right... for a future in an academic life, but also giving me a base if I happen to enter the job market. (Debbie) • So, work on the course's learnings so that I can apply them as my personal tool, as a fashion designer... so I've been doing a lot of exercises to try to do the work in each discipline focused on what I need. (Renée)

	• I have a degree in fashion coordination and production. I'm now creating my company, which is called TFFashion production, which does fashion productions, and marketing studies. My goal on joining this course is to deepen a topic, which is the second-hand clothing market, which will be one of the aspects of my company and I'm studying a possibility, an aesthetic, a market for these brands. I want to simulate a fashion production, so that I have a portfolio for my brand, for my company. (James)
Unexpected indicators	Evidence in the participant's discourse
q1_2 learning community and extended community	• I started doing the Discovery part, until Breaking the Ice, and we had two group meetings already. Which was very interesting, because there are three people with very different experiences in fashion (Renée) • Yeah, I think this is already happening, at least between the three of us. We've been talking, we've even interacted on Instagram.(Carrie) • I believe that placing, for example, my research and my approaches, the study itself, to my colleagues, in discussions... or, for example, on Linkedin, on the platforms where we have this contact, I have their feedback, suggestions and another perspective of what I'm already developing. That contribution on their part, to try to get this feedback from what makes sense to me, but also that I can complement with their opinion. (Debbie)
q2_3 non-linear learning	• I really want to do something new, maybe a project, an interesting result. (Joy) • But it (fashion), as it is today, the way it is and how I experience it, it no longer fulfils me! I want to question, I want to think, look, read, I want something before that (clothing development). I'm going to be working on the urbanization trends versus norms, traditions. I imagined something like this when I chose this theme, you know, but then if that really meets the course goals with that too, I don't know! we are here thinking and raving about what we can present (Carrie) • I studied coordination and fashion production, but when I finished, I decided to follow my passion, photography and at this moment, in parallel, I'm also taking a course in Fashion Journalism. (Terry) • Yes, it is possible to make some photos, a photo shoot, a fashion film and maybe social network posts. In the end it is not a collection produced by us, but a collection for the brand, but it is not (newly) produced, it is second-hand clothes.(James)

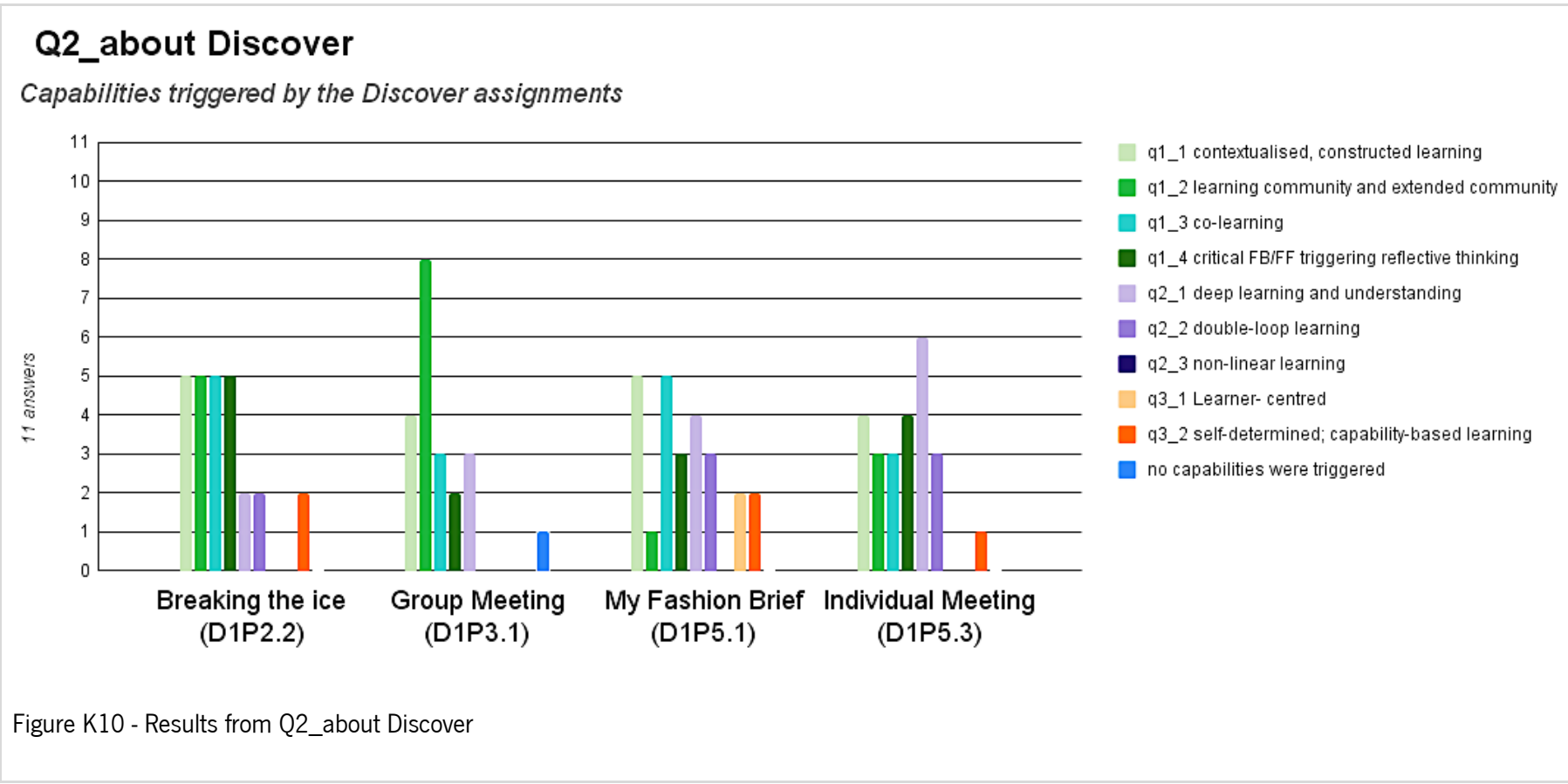


Figure K10 - Results from Q2_about Discover

APPENDIX L

Results from Learning Contract (LC) component

Table L1 D1P6.1_Personalised Learning Agreement (PLA)

Learning Content	How important are the following contents of the course unit? (LC-1)	
	Based on the previous question, is there any other content that you would want/need to deepen your knowledge and skills at? (LC-2). *open question*	
Learning subcomponents	Question	
Learning Outcomes, LO	How much do you agree with the Learning Outcomes of this course unit? (LO-1)	
	What other outcomes do you expect to be able to do or to know, once finishing this course unit? Please itemise. (LO-2) *open question*	
	How will you know you've learned? or achieved the defined outcomes? (LO-3)	
Learning Assessment, LA	The following evidence will be applied to assess you in this course unit. How satisfied are you with them? (LA-1) If you responded, 'Not at all satisfied' or 'Slightly satisfied' in the previous question, what other proof(s) of learning are you willing to take? open question, optional	
	The following deliverables are required in this course unit. How satisfied are you with them? (LA-2) If you responded, 'Not at all satisfied' or 'Slightly satisfied' in the previous question, what other results of learning will you present? *open question, optional*	
	What deliverables could be implemented immediately in your professional setting? (LA-3)	
	Choose the weighting system (W1, W2 or W3) to be attributed to the assessment deliverables. (LA-4)	
	What level of quality for the results are you expecting to achieve at the end of this learning unit? Choose the percentage score that represents your success. (LA-5)	
Learning Methods, LM (within the Online Learning Experience, o-LE)	Mark all activities you are able to complete in order to achieve the outcomes. (LM-1)	
	Mark all the tools and resources you are familiar with, have access to, or are willing to use to achieve the outcomes. (LM-2)	
	Indicate the expected period for completing this course unit (LM-3).	
	Indicate the number of hours per week you will dedicate to complete the assignments (LM-4):	▫ Discover ▫ Define ▫ Develop ▫ Demonstrate ▫ Deliver

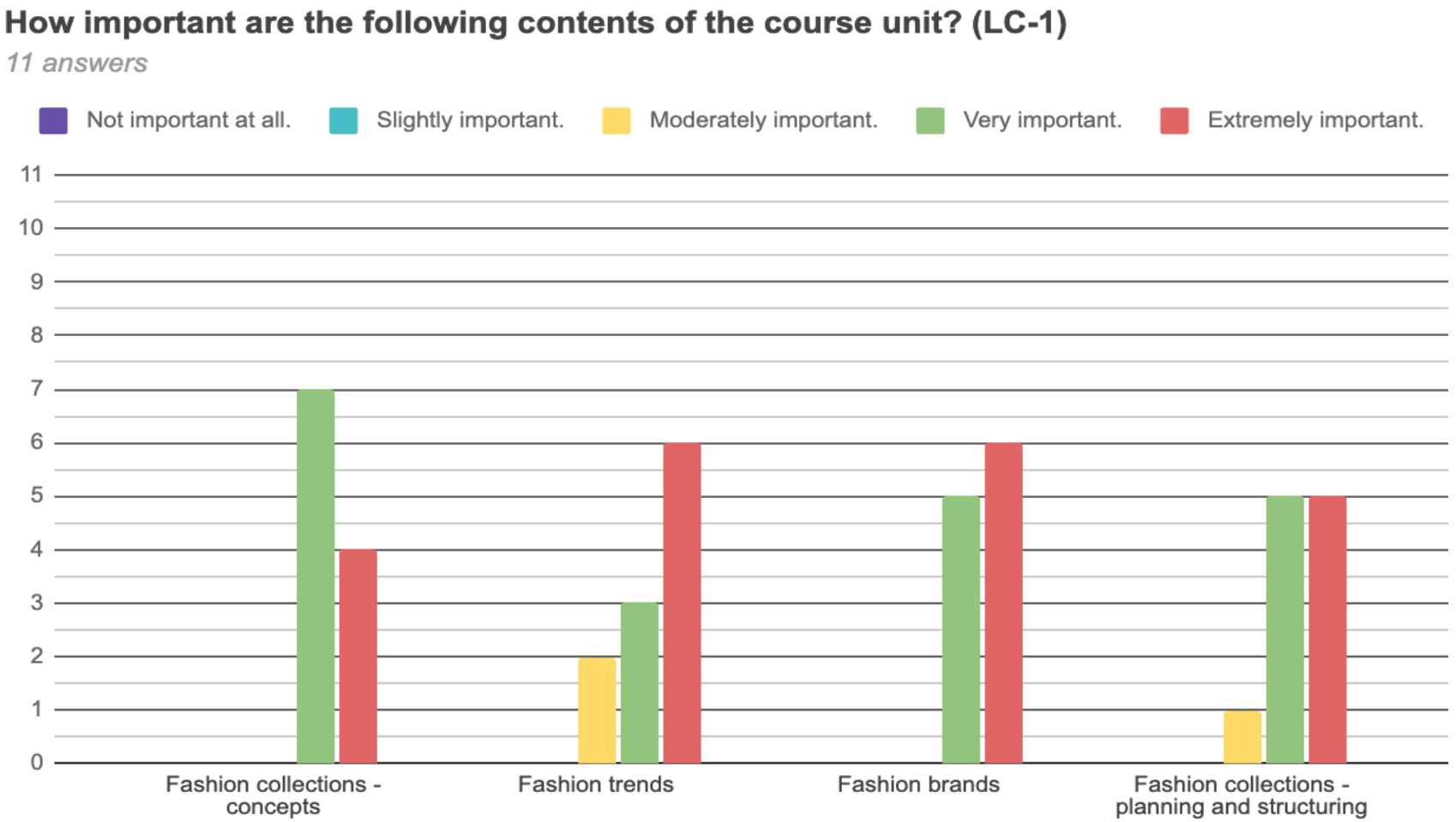


Figure L1 - Results break down - Negotiating the Learning Content.

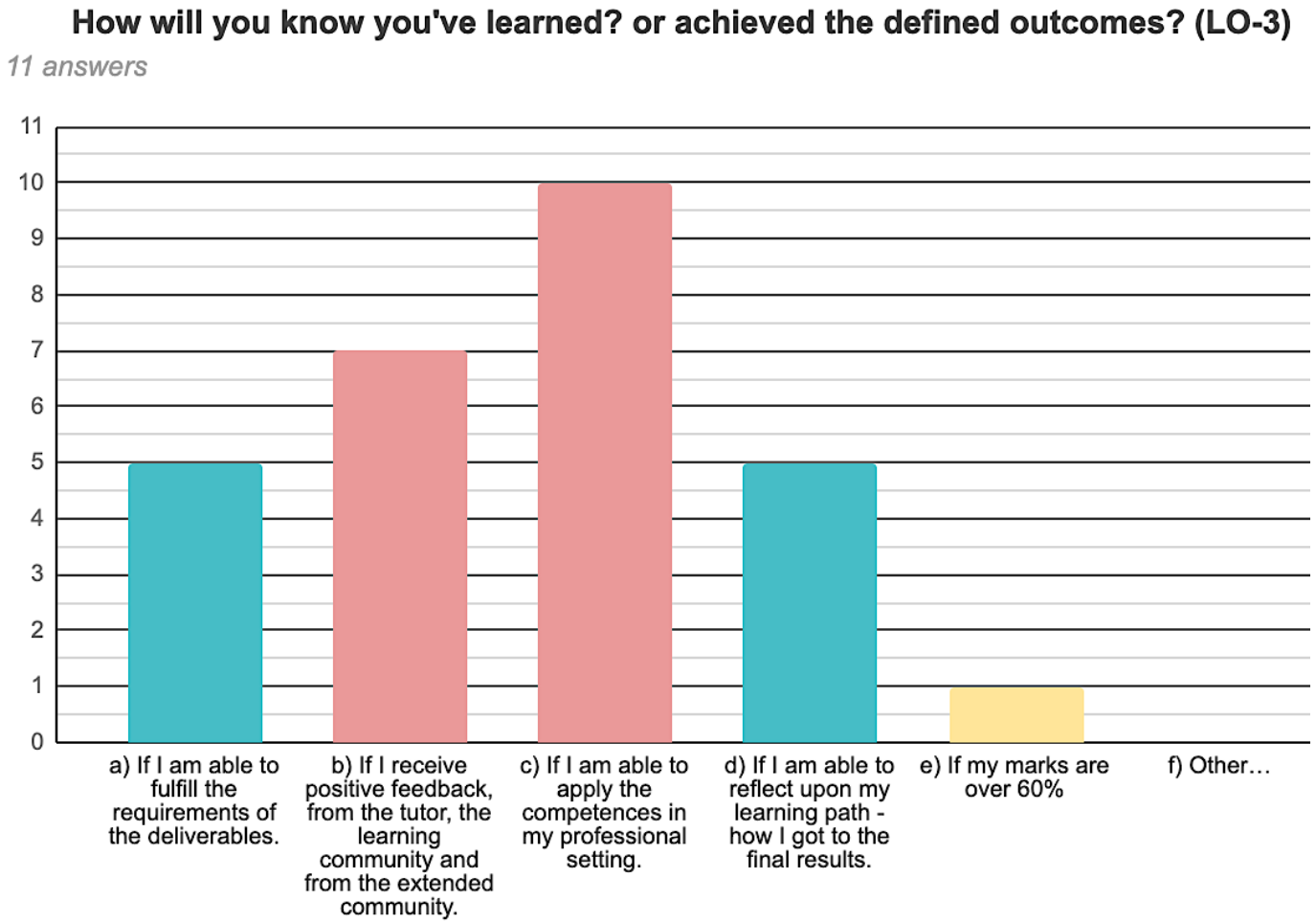


Figure L2 - Level of achievement for the learning outcomes.

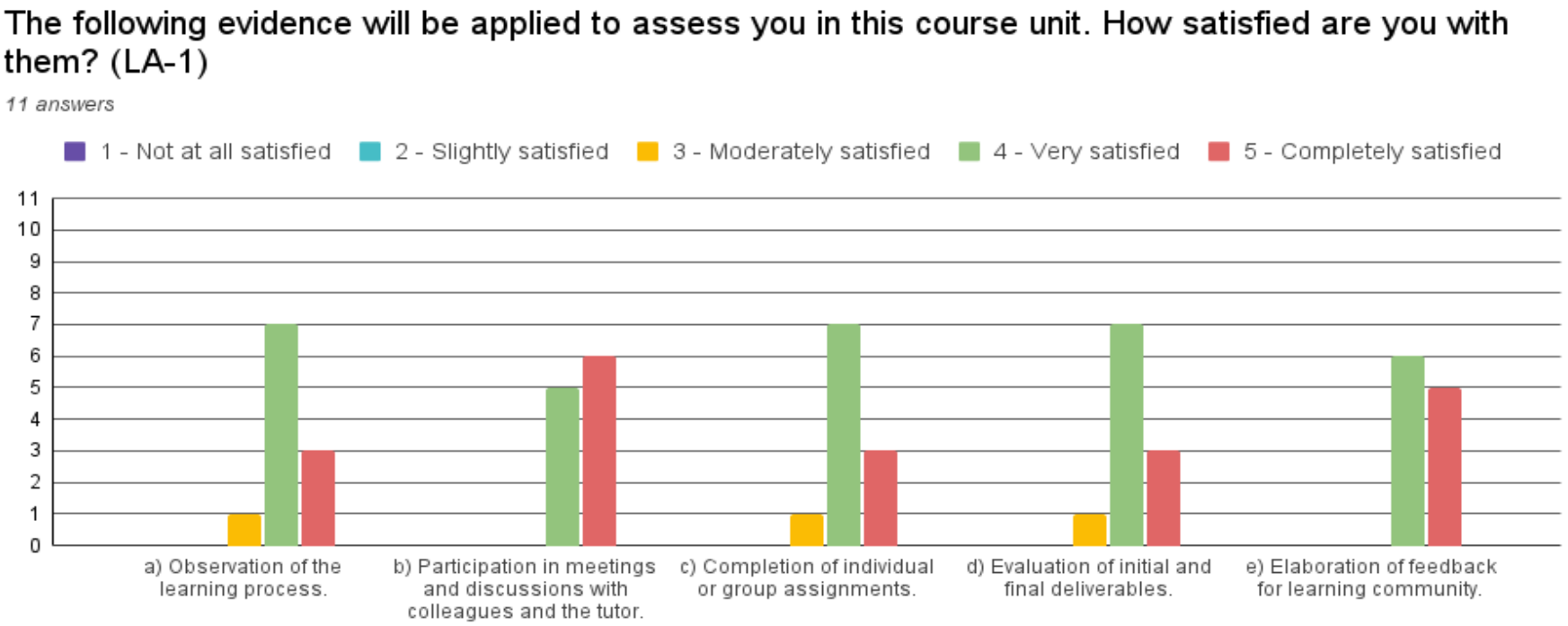


Figure L3 - Results break down - Negotiating the Learning Assessment (La).

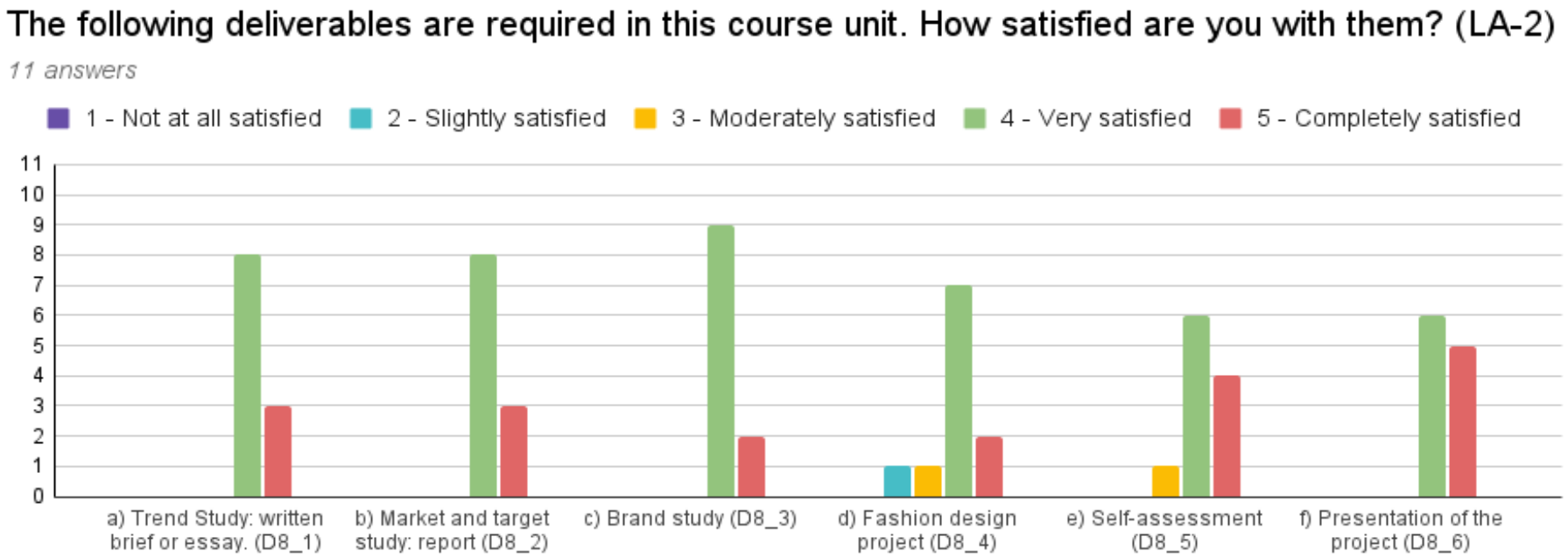


Figure L4 - Level of satisfaction with the deliverables.

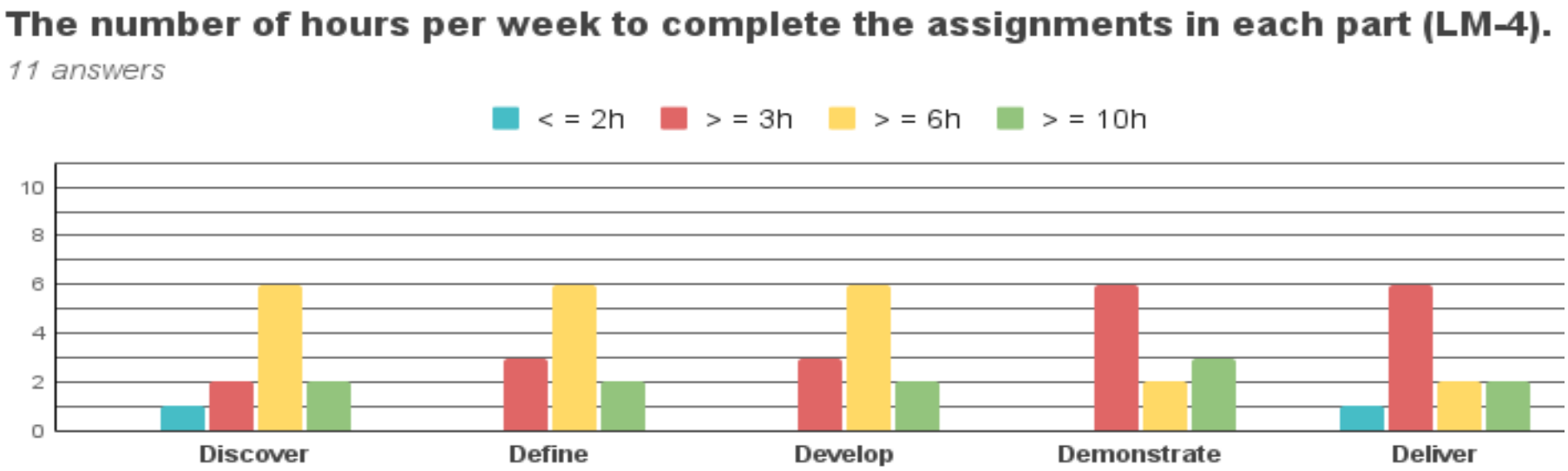


Figure L5 - Time participants allocated to each part of the FDOC.

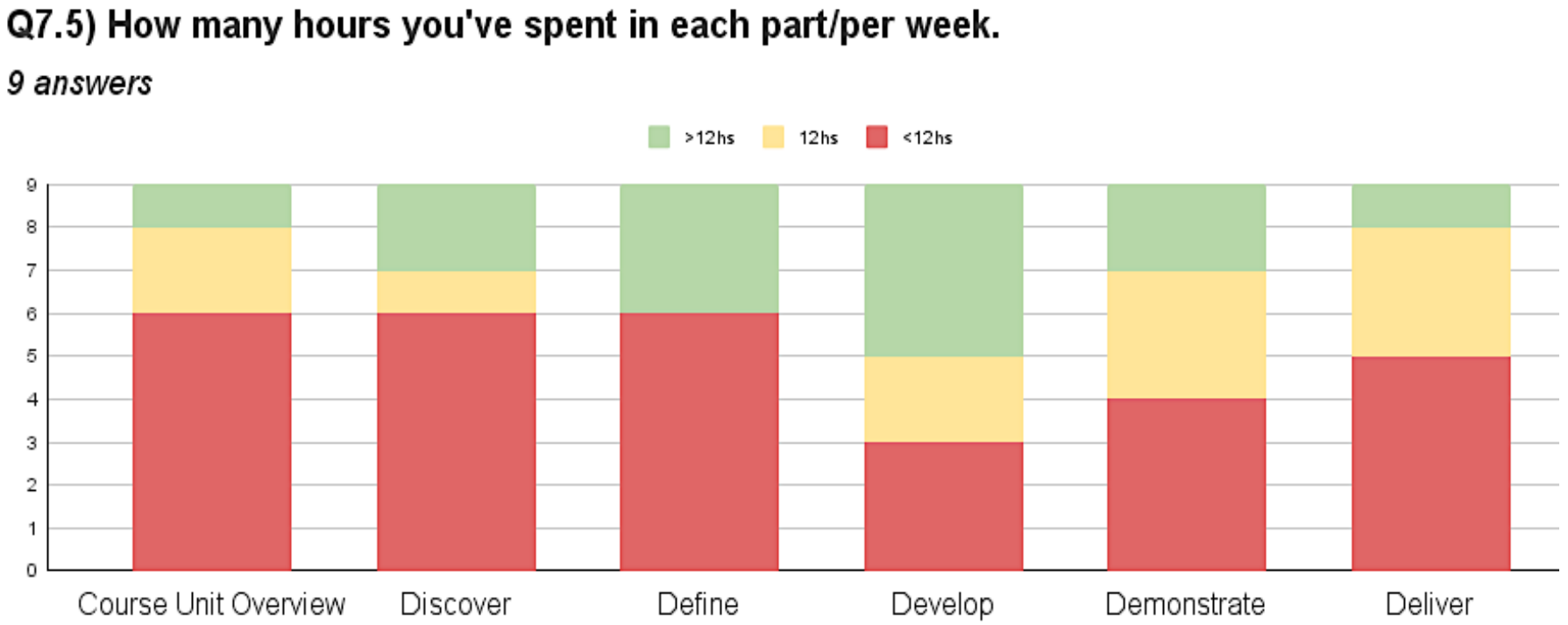


Figure L6 - Time participants spent in each part of the FDOC.

APPENDIX M

Results from the Learning Experience (LE) component

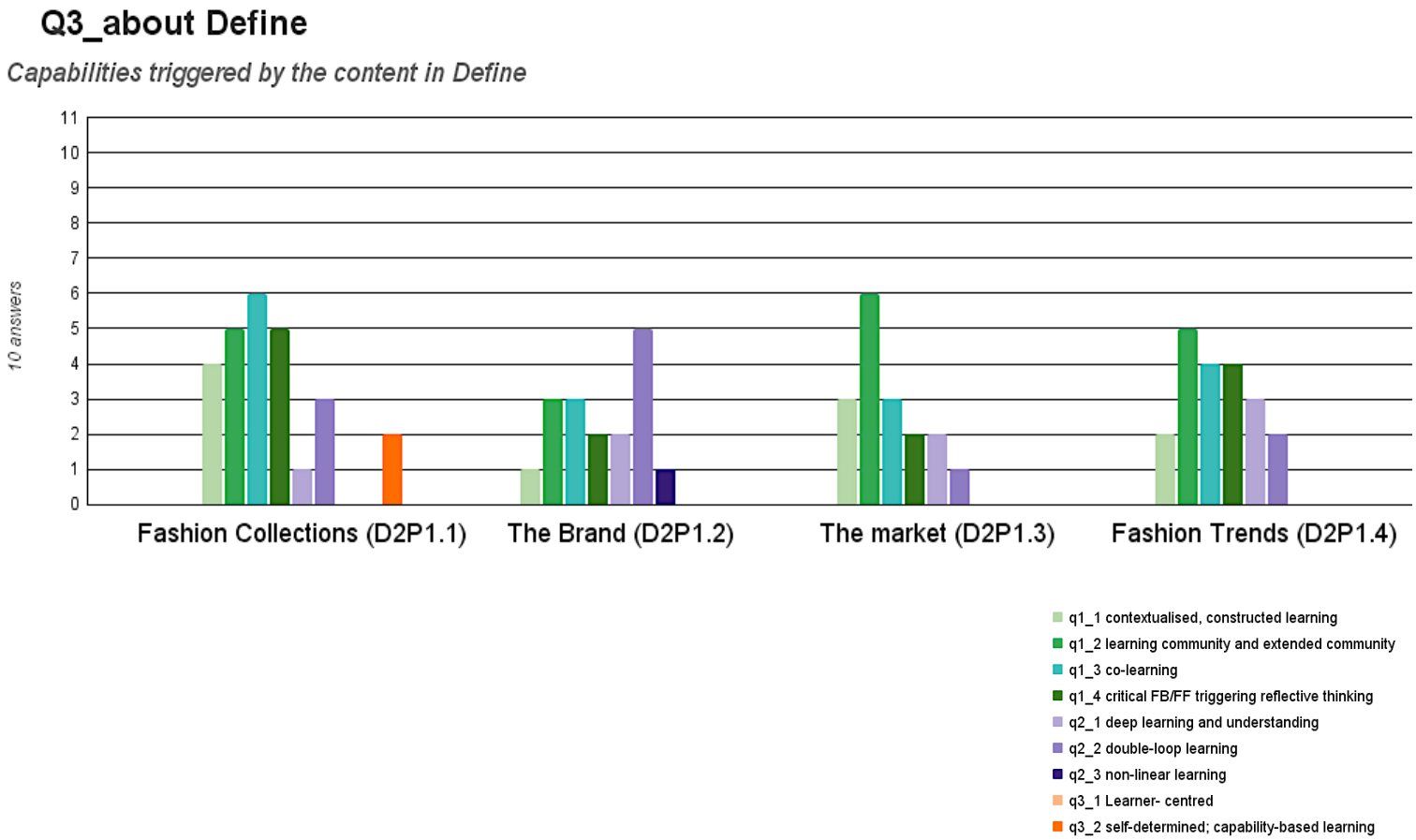


Figure M1 - Results breakdown - Q3_about Define

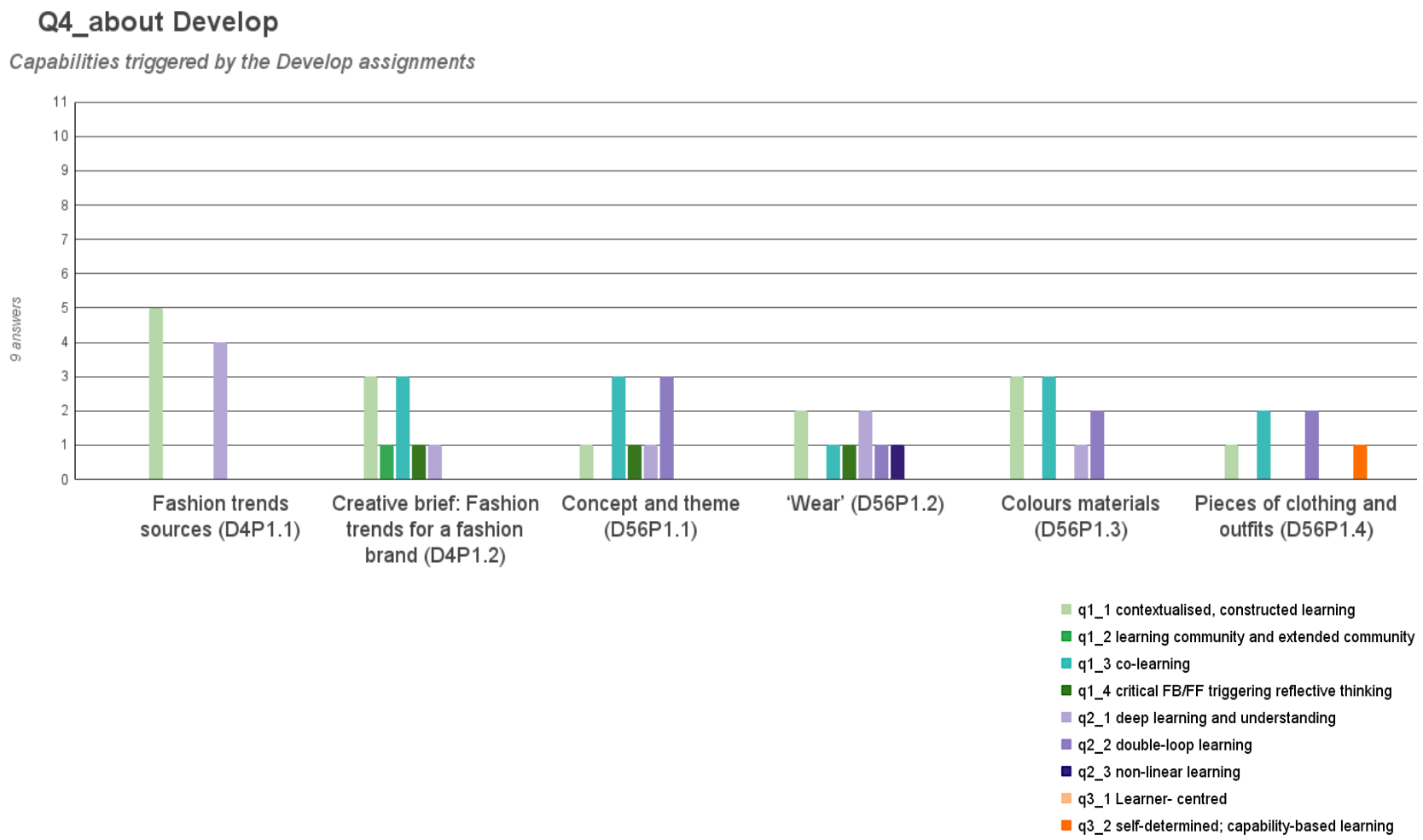


Figure M2 - Results breakdown - Q4_about Develop

Figure M3 - Results from the final submissions (D7P1.1_Fashion Collection)

Table M1 Reflective Learning Journal, transcriptions

Expected indicators	Evidence in the reflective learning journals
q1_1 contextualised, constructed learning	The course model provided me with learning and updating references applied in fashion design, as my studies were being incorporated by all design specificities (product, service, graphics, information systems, advertising and digital marketing) Erin's reflection about the learning model. I really enjoyed doing this exercise, because I had the opportunity to deepen my research skills and to address current topics and trends. I decided to do the exercise with an image search because I think the idea of building a super dynamic and appealing gallery. James and Terry's journal (reflection on the assignment D1P4.3_Glocal Fashion)
q1_3 co-learning	It was super important and interesting because in addition to meeting new people at different stages of life with different points of view, I received some positive feedback that gave me confidence and persistence to continue my project. James and Terry's journal (reflection about the assignment D1P3.1_Group Meeting) I had the opportunity to observe the work done by other students of the course. James and Terry's journal (reflection about the assignment D7P1.1 Fashion design collection, initial results).
q1_4 critical FB/FF triggering reflective thinking	I received feedback from my colleagues. In this way I understood what could be improved and what was well done... is interesting, because it offered me another point of view. James and Terry's journal (reflection about the assignment D7P1.2_FB/FF, final report). Today I started to build my presentation and reviewed it. I reviewed my entire presentation. I changed two slides since the presentation I did. Andreana suggested that I change the way I was presenting my positive and negative points and I did it today. Now they look like a mindmap. It's better to understand my trend decoding. Carrie's journal (January 21th, 2021)
q2_2 double-loop learning	I reflected on all my work throughout this project. James and Terry's journal (reflection about the assignment D7P2.3_Self-scoring) In the past two years I'm realizing that I should risk and put face my and my work to the world. It's sometime a difficult task, when I'm comfortable as a public agent and a fashion design like I want to be... This fashion unit with Andreana have proportionate doors to my mind that I have chasing about two years. Although I have started the units later them initial date, and maybe I'll not have time to read all learnings, just the conversation group and task assignments is moving my body and my mind to get up and get out of my comfy place. I think not expected so much, I done more in the last month them the last 8 years. Renée's reflection.
q3_1 learner-centred	This topic is very important in my opinion, because it is a record of our entire journey through the course unit. James (reflection on the assignment D1P5.1 My fashion Brief) I gathered the results of the survey submitted in Canva's presentation. I got 23 responses that were close to what I imagined getting... Anyway, I found the research tool very valid, as it offers qualitative and quantitative results based on the real consumer. Joy's journal (reflection on the assignment D3P2_About the market, January 21th, 2021)
q3_2 self-determined capability-based learning	I'm doing everything inspired in other brands and based on my observation. I have a lot's of women around me with more than 50 years. And these 'girls' gonna be my inspiration. Joy's journal (reflection on the assignment D3P2_About the market, December 16th, 2020) I had the opportunity to reflect on my brand. Describe its history and define the values I intend to follow. James and Terry's journal (reflection on the assignment D3P1.1_Brand identity definition) I cannot work with any drawing program suggested in the course. I can't download 3D paint either, due to a problem with my computer's configuration. I can only do it in the old paint. The quality is far below what is desired. But that's what I got. Carrie's journal (January 23th, 2021)

*In this assignment, you will create a **Reflective Learning Journal (RLJ)**, that you use throughout the course unit to record your learning experience and the assignments.*

Each assignment will be an 'entry' in your RLJ and you should explain how you approached the assignment, so that it made sense to you, in a personal and professional level.

The reflective journal is private and you will share it only with your tutor, at 'Demonstrate'.

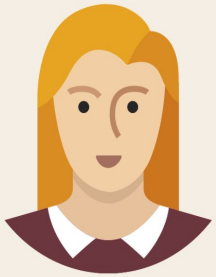
- The first entry of the journal is a 'brief' about yourself, as a fashion learner and/or as a fashion professional.

What to include in your 'brief'?

- Value your previous experience, field of expertise. What you gained from it?
- Identify your needs of learning, expected outcomes. What you pursue?
- Document your learning experience in this course unit. Include the assignments, with a brief analysis of how you develop them. How useful it was for your learning goals?

You can create your journal on Blogger, DayOne or Penzu or any other tool you are more familiar with.

NEXT LESSON



Renée's learning journal

"Today I can contribute with reuse old clothes to create new ones. Not using the same shape, but unraveling it to build another one, with a shape in a way consistent with the current trend. Certainly I'll have to study more about the trends across the time after, and observe the people around me and my consumers. Constantly I will have to review the materials used and the wasteful that will generate. With a designer in a constant innovation brain, my skills will never be enough. A designer needs to renovate and upgrade his competencies ever."

assignment Future in/for Fashion (D1P5.2)

"The proposal of design it is a service and a product. I think to reuse jeans or others materials to do new clothes. This materials can bring to me by the client, an garage sale, a second hand store, even by my own stock.

assignment Brand Identity definition (D3P1.1)

PRÓ PÔS ME is a brand to build ideas from old to new designs. We identify ourselves like a transforming mind that make the new from wasted clothes."

Figure M4 – excerpt from Renée's journal

Figure M5 - James reflective journal

James and Terry prepared a straightforward document, in which they described and planned the proposals of each assignment, commenting, and reflecting on how they could address them. This demonstrated reflective thinking capabilities (expected indicator q2_2). In the assignments *D7P1.1_Fashion design collection, initial results* and *D1P3.1_Group Meeting*, for instance, James got to know the projects of more experienced professionals and felt validated by their feedback.
Furthermore, by reviewing how he completed each assignment, he became more aware of the path he had taken as a learner, which helped him to be prepared for future opportunities of learning.
When commenting about the content, James built a learning path from understanding the main topics to adapting it to his project goals, demonstrating that he was able to use the content and expand it, accommodating what he intended for his brand and thus triggering unexpected indicator q2_3.

Table M2 Results from D7P2.3_self-scoring

PLA - LA negotiation				D7P2.3_ self-scoring							Final self-scoring per student
Participants		Deliverables:		D8_1 Trend Study		D8_2 Market and target study	D8_3 Brand study			D8_4 Fashion design project	
		Assignments:		D4P1.1	D4P1.2	D3P2.1	D3P1.1	D3P1.2	D3P1.3	D7P1.1	
Name	Profile	Weighting system	Expected level of achievement	SC-1	SC-2	SC-3	SC-4	SC-5	SC-6	SC-7	
Carol[101]	P2	W1	—	Very Good	Very Good	Good	Excel	Very Good	Excel	Excel	Very Good
Carrie		W2	60%-69% (Good to Very Good)	Excel	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Debbie	P1 - P3		70%-100% (Very Good to Excellent)	Good	Good	Good	Good	Good	Good	Good	Good
James	P3	W3		Very Good	Excel	Very Good	Excel	Very Good	Excel	Excel	Excellent
Joy	P2			Good	Suf	Insuf	Insuf	Insuf	Insuf	Suf	Insufficient
Nadia	P1	W2		Excel	Very Good	Excel	Very Good	Excel	Excel	Excel	Excellent
Renée	P1 P3			Very Good	Insuf	Insuf	Insuf	Insuf	Insuf	Insuf	Insufficient
Terry	P3			Very Good	Very Good	Good	Very Good	Very Good	Very Good	Very Good	Very Good
Final self-scoring per assignment				Very Good	Good	Good	Good	Good	Good	Good	

[101] Carol did not complete the Personalised Learning Agreement, PLA, accepting the terms of the standard Learning Contract.

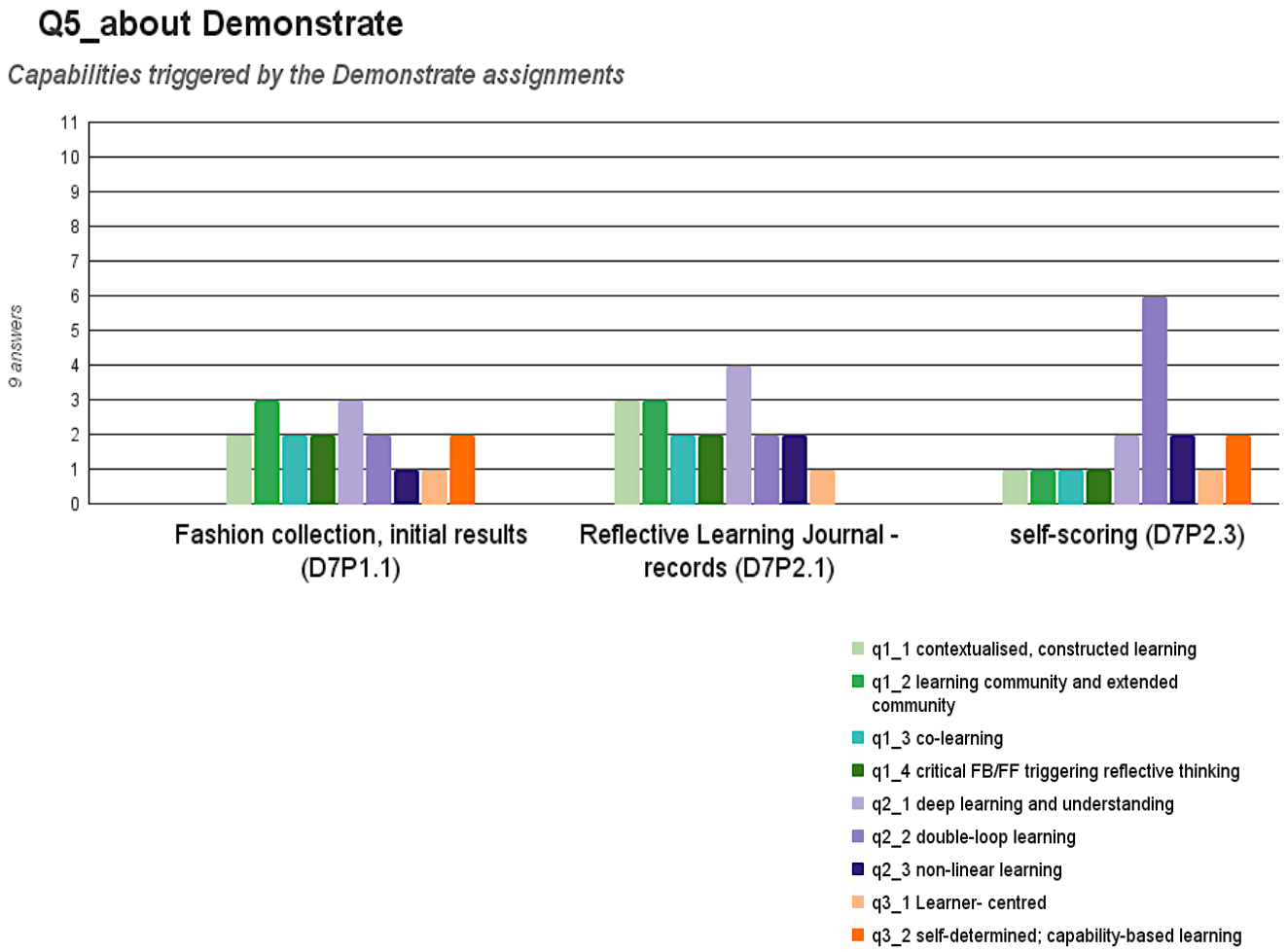


Figure M6 - Results breakdown - Q5_about Demonstrate

APPENDIX N

Summary of the Learning Components analysis

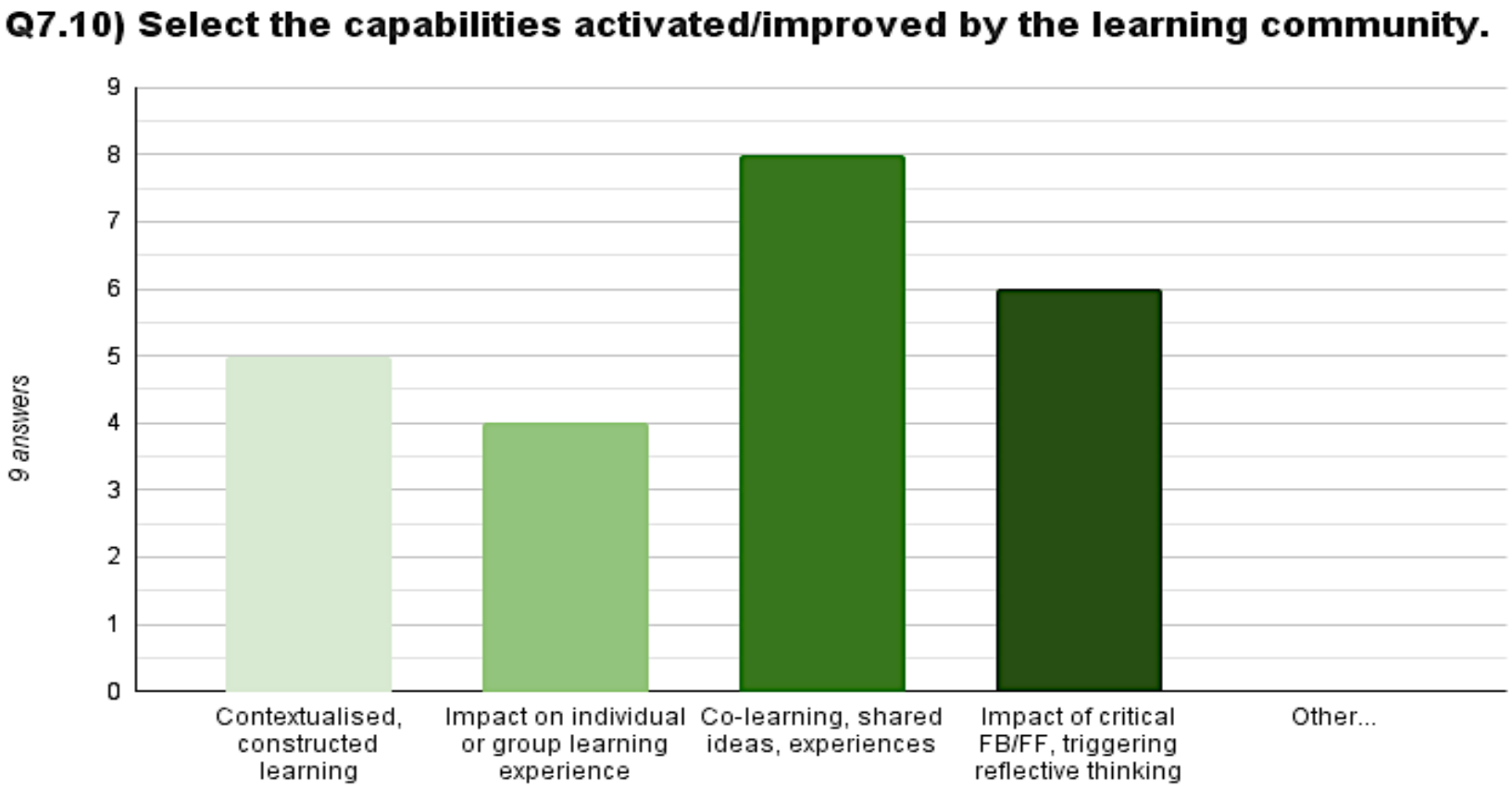


Figure N1 - Participants identifying the Research Question 1

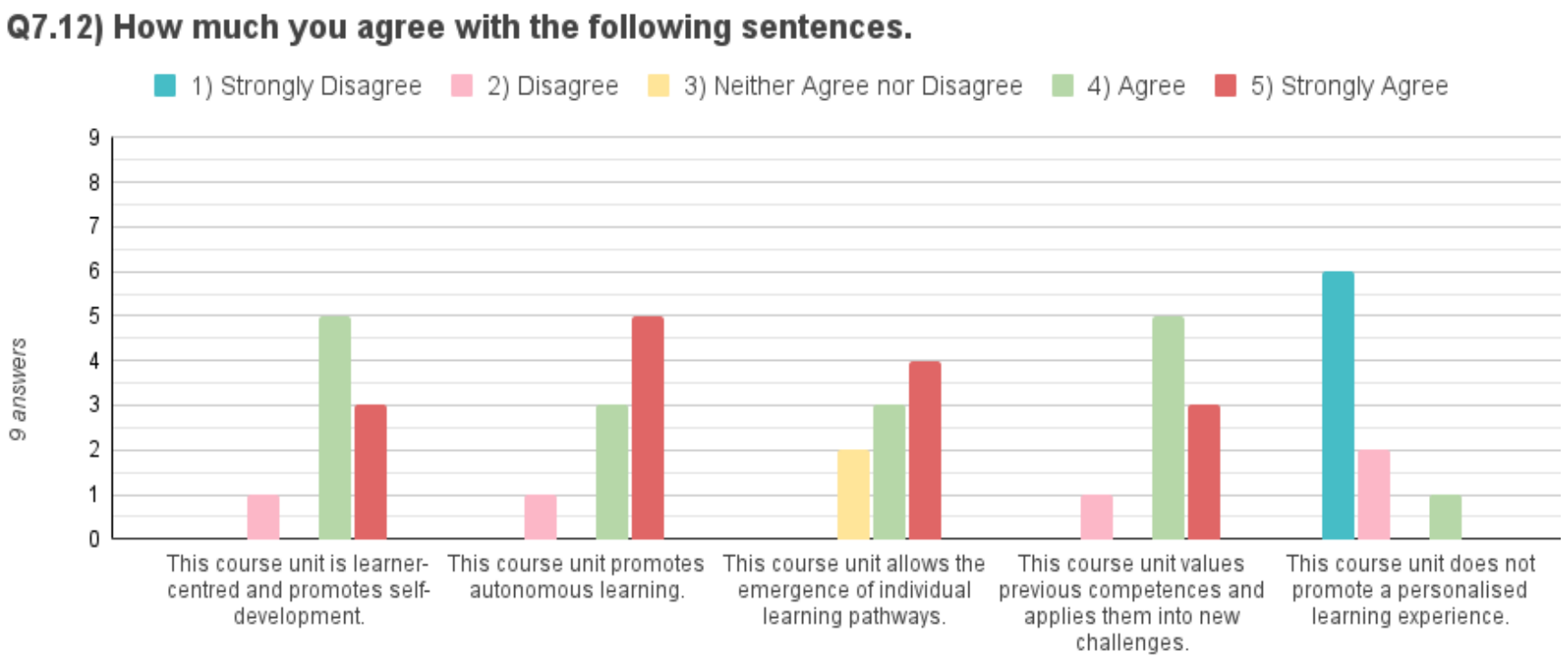
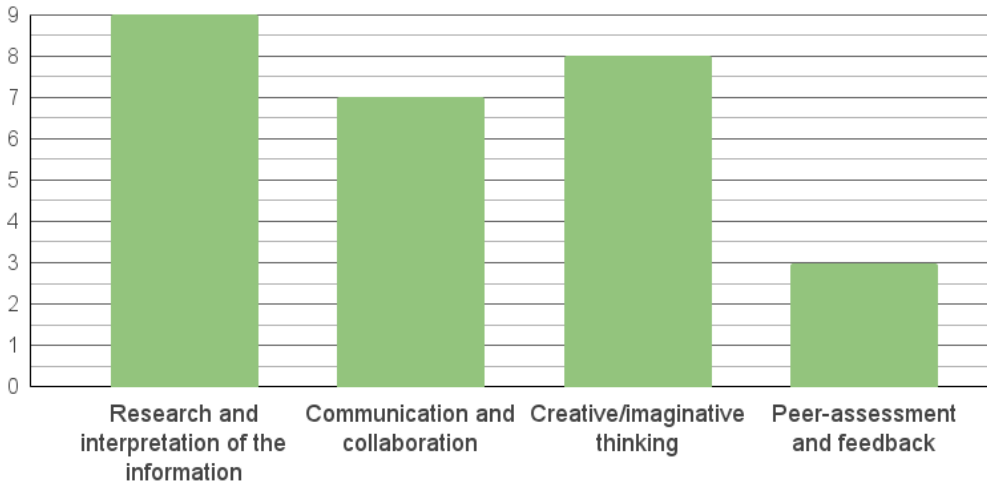
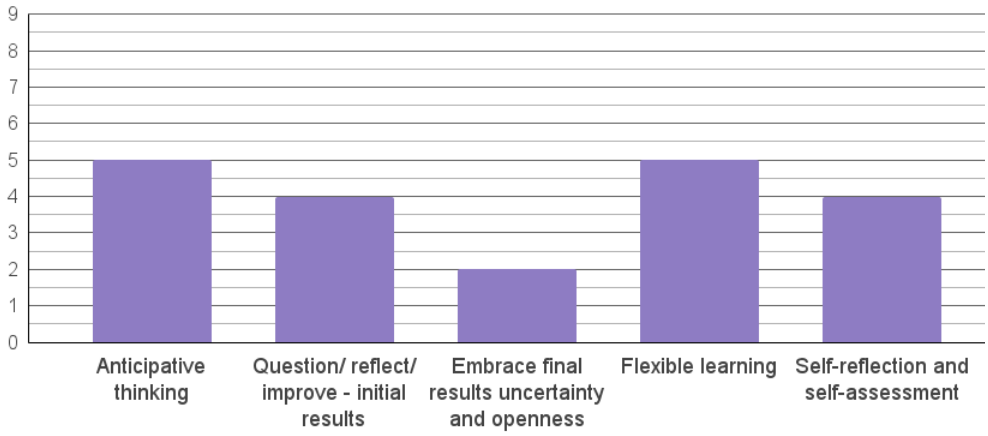


Figure N2 - Participants identifying the Research Question 3

Q7.17) Select all aspects that contributed for 'translating fashion information (trends, brand, market) into elements for the fashion collection':

9 answers





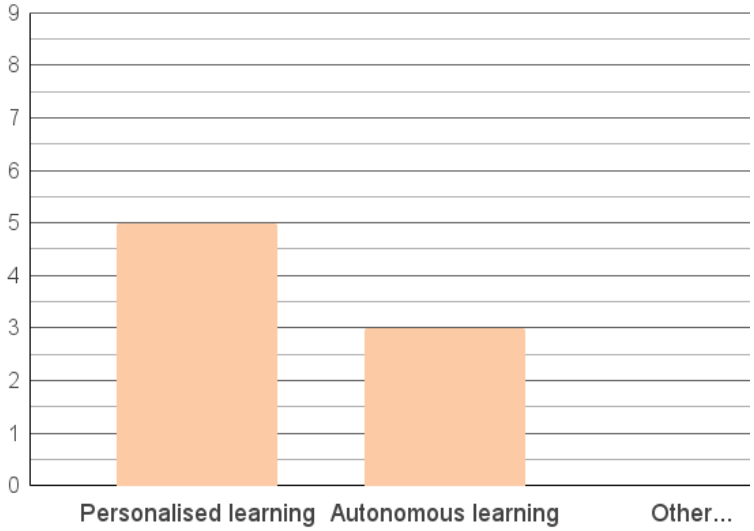


Figure N3 - Learning aspects contributing for the fashion projects.

Table N1 Excerpts from the discussion in the Focus Group, Activity 5.

"we students could focus on subjects of greatest interest to apply them in the professional environment." general comment from participants "the knowledge and expertise exchange between the learning community generated different views about certain areas of fashion which, consequently, could be applied in the professional environment" Nadia
certification is very important for the professionals and companies because they demonstrate that the professional is self-improving, it validades professional experiences and differentiate professionals in the market. Carol, Debbie, Nadia and Renée "I joined this course unit also because it offered a certificate of participation from an accredited educational institution, but I think that companies do not provide opportunities for professionals who want to improve themselves, they do not value them" Renée "for the company what matters most is how much that person adds in terms of ideas, values. Develop the individual to act! This is more important than the diploma." Carrie "Only through the learning results, from the course curriculum, will the company be able to adjust with their profiles, what they are looking for, the requirements for the vacancy for the post of work" Carol.
"we started as a learning community and then each one decided to continue individually, which did not promote possibilities of networking" Carrie "I agree because we had contact with different professionals from different parts of the world with different abilities and interests, that is, it promotes a very positive exchange of skills." Carol
nonlinear and online learning produce more purposeful professionals with the ability to work in groups, a capacity relevant for the 'global professionals' that also need to be open to new learning opportunities constantly. General comment from participants
different pathways were made possible during the learning experience, from the new tools and paths for developing studies and research in fashion to the knowledge about different areas, the identification of other points of views, all collaborated to produce new ways of thinking. General comment from participants.
"I considered it a hybrid experience since some work had to be done individually by the student combined with tutoring" Carol "I was really happy because I was able to develop a study aimed at a project that was long forgotten." Renée
The course unit allowed more contextualised and meaningful learning, not only because they could connect with different professionals, but they could bring their knowledge and ideas and adapt into the content and then use it back in their professional lives. General comment from participants. "fashion sector having a profile of innovation, can only be aligned with the online, collaborative and personalized learning, since it enhances the creative process" Renée "the learning model might work on some areas of fashion design, since others will require face-to-face tasks, such as material handling and prototyping a piece for example". Nadia
"I do not agree. I believe that this online and collaborative learning opportunity is valid for all types of profiles, as long as there is a specific desire and motivation." Debbie "I believe that the student does not need to have a specific profile, but specific interests." Carol

Table N2 participant's final remarks during the Focus Group

Research Questions	Statements presented	"How much you agree"	Excerpts from the discussion in the Focus Group
RQ1 Collaborative Learning	*"this learning model is more compatible with the current and future demands and socioeconomic contexts that influence the current systems of teaching and learning fashion design."*	'Agree' • 1 answer 'Strongly Agree' • 4 answers	"I totally agree, because non-linear learning goes hand in hand with the creation process, which is also non-linear. Furthermore, the world is moving towards increasingly collaborative processes. The Covid 19 pandemic served as an accelerator of this process, as it made it possible for people to experience teaching and creation and execution processes at a distance." Carol
RQ2 Prospective Learning	*"this learning model will promote a constant update of knowledge in fashion design, efficiently, with high-quality standards in acceptable costs for the sector professionals."*	Agree' • 2 answers 'Strongly Agree' • 2 answers Not answered • 1 answer (Carol)	"This learning model serves as a manual that is constantly updated, in the sense that the professional can turn to various moments of doubt, improvement, and training. In short: A platform that offers tools to always improve." Debbie
RQ3 Personalised Learning	*"this learning model will satisfy the personalised learning needs and specificities of the different professionals' groups and companies."*	Agree' • 3 answers 'Strongly Agree' • 2 answers	"I believe so, as the contents are diverse and the platform is not linear, it is possible for each participant to adapt to their individual interests. These contents can also be adjusted and selected by the participant in accordance with the market." Carol

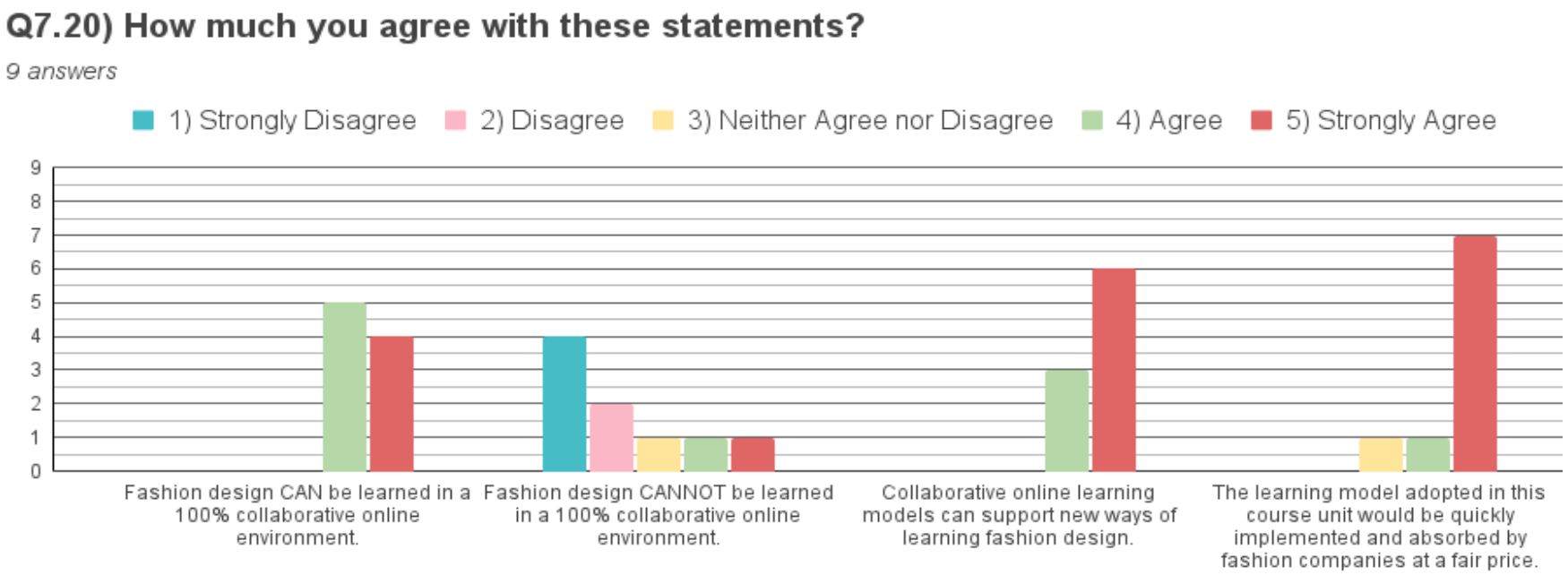


Figure N4 - participant's opinions about the learning model and the trial course unit.

This question also presented two exactly opposite options, aimed to confirm participants' opinions: *Fashion design CAN / CANNOT be learned in a 100% collaborative online environment.* It was expected that they would provide exactly opposite answers. However, two participants (Carol and Erin) provided the same answer (Agree and Strongly Agree) for both options. Nevertheless, most of participants "Agreed" (5 answers) and "Strongly Agreed" (4 answers) that Fashion Design can be learned in an 100% online environment.

APPENDIX Q

The Learning Components versus the Research Questions

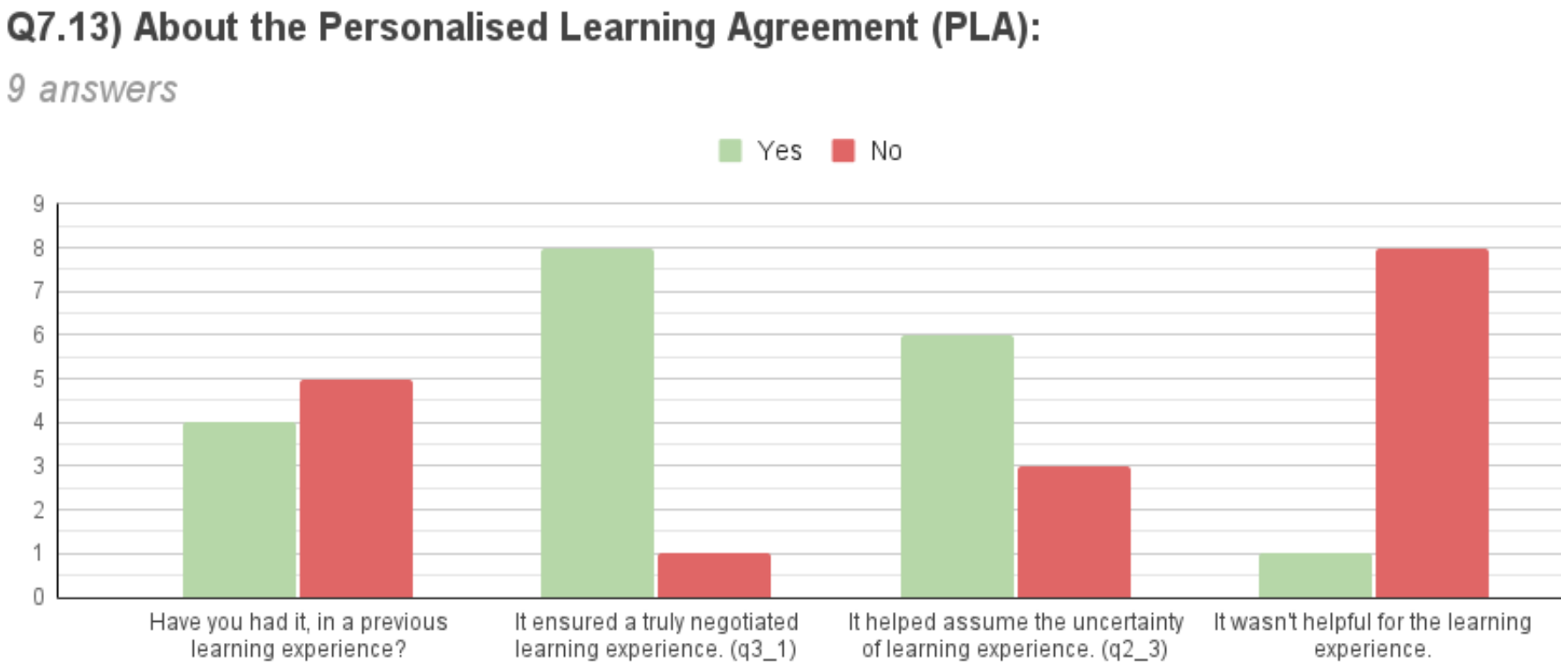


Figure Q1 - Participant's opinion about the Personalised Learning Agreement (PLA).

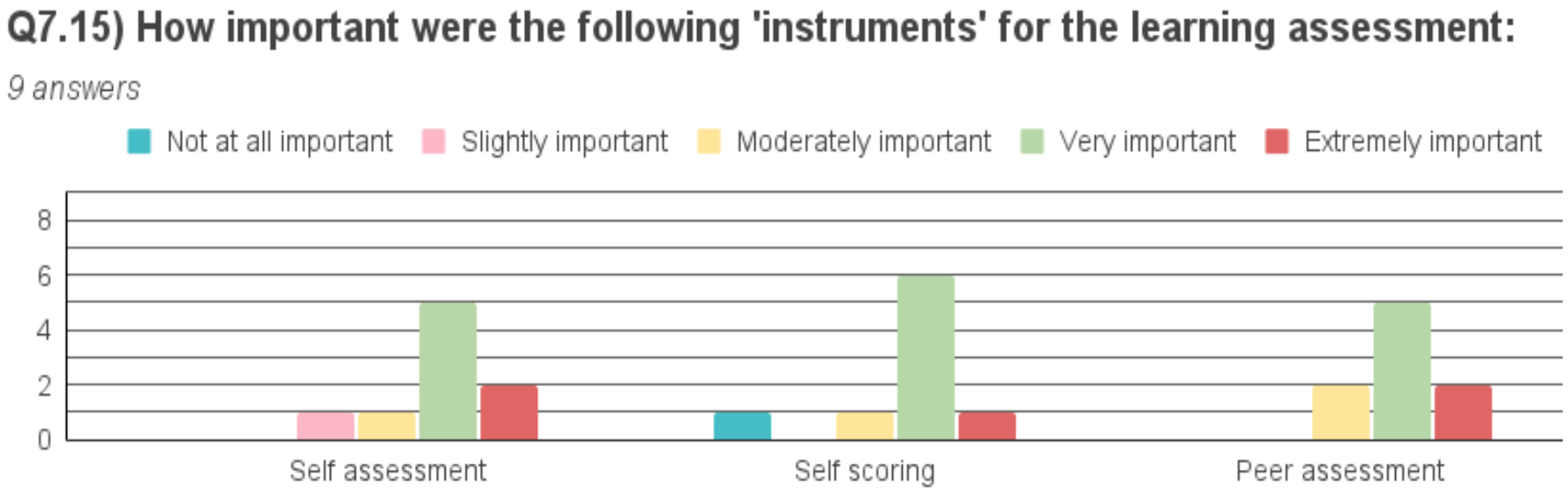


Figure Q2 - Participant's opinions on the instruments of the learning assessment

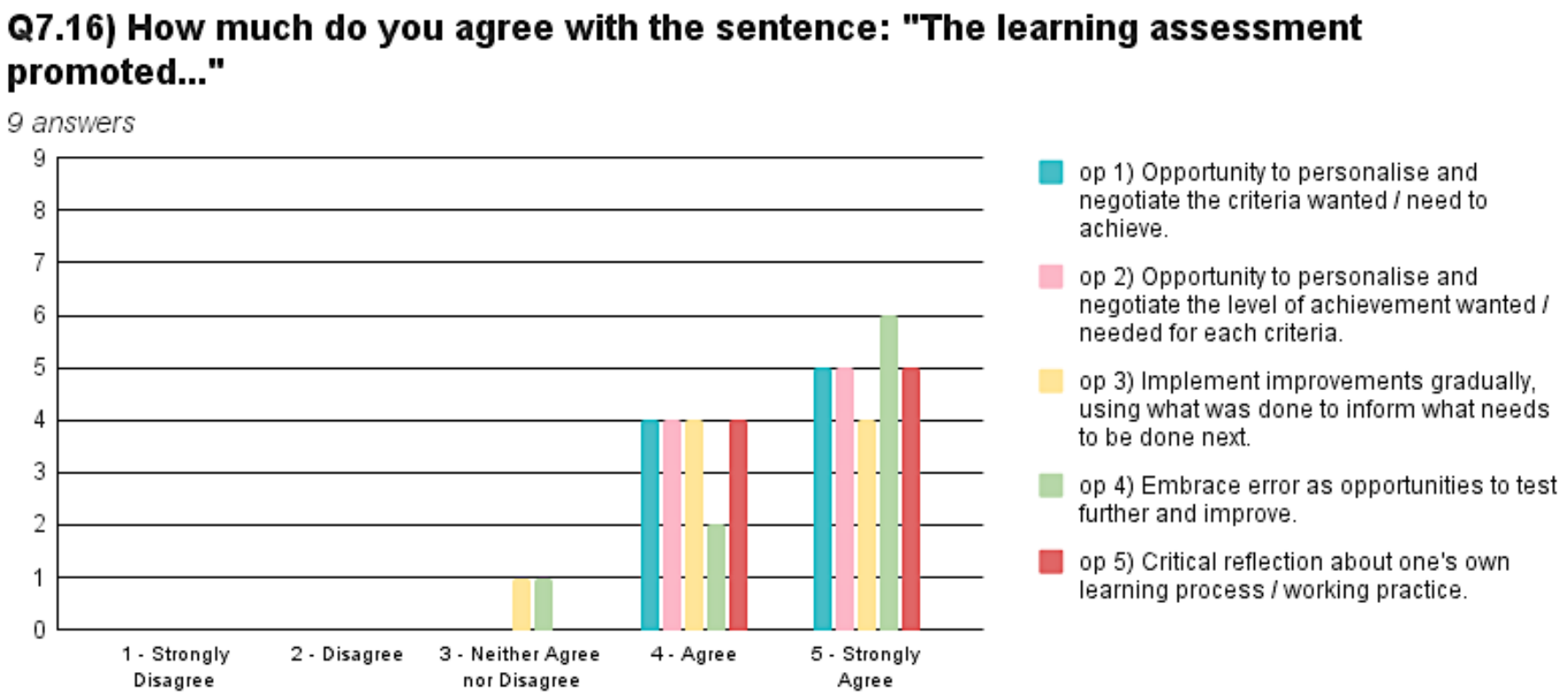


Figure Q3 participant's opinions on aspects contributing to the earning assessment.