E&PDE 2023

Engineering and Product Design Education

RESPONSIBLE INNOVATION FOR GLOBAL CO-HABITATION

Proceedings of the 25th International Conference on Engineering and Product Design Education

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Editors

Isabel Ordóñez
Paolo Sustersic
Lyndon Buck
Hilary Grierson
Erik Bohemia

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Editors: Isabel Ordóñez, Paolo Sustersic, Lyndon Buck, Hilary Grierson, Erik Bohemia,

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Isabel Ordóñez
ELISAVA, Barcelona School of Design and Engineering

Paolo Sustersic
ELISAVA, Barcelona School of Design and Engineering

Lyndon Buck
Aston University

Hilary Grierson
University of Strathclyde

Erik Bohemia
Western Norway University of Applied Sciences

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Institution of Engineering Designers
Courtleigh, Westbury Leigh, Westbury, Wiltshire, BA13 3TA, United Kingdom.
+44 (0)1373 822801.
www.ied.org.uk

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The Design Society
University of Strathclyde, 75 Montrose Street, Glasgow, G1 1XJ, United Kingdom.

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E&PDE 23 Foreword

Responsible innovation for global co-habitation

The 25th International Conference on Engineering and Product Design Education (E&PDE) with the theme 'Responsible innovation for global co-habitation' was held at the ELISAVA, Barcelona School of Design and Engineering, UVIC-UCC on the 7th and 8th of September 2023.

The conference was hosted by the ELISAVA, Barcelona School of Design and Engineering, providing the principal locations and support for the conference. The conference was planned and arranged with the Design Education Special Interest Group (DESIG) of the Design Society, and the Institution of Engineering Designers (IED).

The E&PDE conference was initiated in 1999 in the United Kingdom and was consolidated as an international conference in 2004; alternately taking place in the UK and abroad. Its objective is to facilitate the bringing together of people from within education and industry who are interested in sharing expertise on the implementation and analysis of contemporary and developing methodologies in engineering and design education. It provides educators and researchers from product development, engineering and industrial design, together with industry and government representatives, with a platform for discussion on topical educational issues in design education and its future direction.

In 2019, the conference introduced visual papers where sketched images are essential in communicating the primary information, and text plays a supporting role. Visual papers aim to contribute new knowledge that have educational or research interest of the conference.

Conference theme

Design and Engineering have innovation at the core of their professional practice. Innovation might come from a technocentric drive, pushing technology to new limits without considering why or how that affects us as a society and a global community. The environmental crisis and the lack of improvement in areas such as pollution, biodiversity loss and climate change, demands that our efforts focus into new ways of co-habiting the spaces we share with each other, be it other cultures, other species, and the diverse eco-systems that support us. Therefore, we would like to dedicate the E&PDE 2023 conference to consider and expand the professional and pedagogic role that designers and engineers have in engaging on **Responsible Innovation for Global Co-habitation** that allows us to create futures that are inclusive, fair and pluralistic.

These proceedings are based on a call for papers that aims to:

- Share and improve design and engineering education, teaching and learning experiences
- Develop educational concepts and strategies to help students and graduates address current and future challenges
- Provide a platform to engage a wide and diverse community of participants and explore the various themes from different perspectives

These aims were addressed through the following conference tracks related to Engineering and Product Design Education:

- The effect that design and engineering have on global co-habitation
- Responsible innovation in design and engineering education
- Professional perspectives for design students in a pluralistic future
- International, multi-sectorial or multispecies collaborations
- Ethical, social and/or environmental issues in design and engineering, and their education
- Design and engineering as agents of regeneration and transformation

- Design and engineering from under-represented perspectives
- The potential of interdisciplinary activities to foster responsible innovation
- Sustainable development and working towards UN Sustainable Development Goals
- Established, alternative and emerging educational paradigms to equip engineers and designers for future challenges

During the conference over 150 participants from 24 countries delivered 4 workshops and 116 presentations. The initial conference call attracted 219 abstracts including 3 visual papers and 48 student contributions. After double blind peer review process of the full papers, 119 contributions were selected to be included in the 2023 E&PDE proceedings.

Keynote speakers were invited to discuss the topic of the conference. Clara Guasch Sastre who works in the strategic material and innovation development, spoke on her background and interest in systemic change through circularity and for more sustainable options. Clara was part of the core group for the Better Cotton Initiative in its initial and consolidation stages. At IKEA she also led the agenda for material and innovation development for textiles. In Elisava she takes part in the DTNM (Design Through New Materials) Master. She has lectured at ETP Textiles in Brussels, at DAE in Eindhoven, at the Volkenkunde Museum in Leiden and at MA-DE in Barcelona. She is a member of the council of the Urban Innovation Platform for Barcelona, BitHabitat, and of Hemp the Climate, an organization that supports the development of hemp as a climate positive industrial material re/source. As a consultant and advisor on strategic material and innovation development, Clara is helping companies shift towards more sustainable models. She wants to see positive change happen. To that end, she engages in different initiatives across various sectors. Whilst she keeps researching materials and innovations in connection to sustainability.

John Thackara was the second invited keynote speaker. John is a writer, advisor and event producer. For more than thirty years he has travelled the world in search of stories about the practical steps taken by communities to realise a sustainable future. John is the author of a widely-read blog and of How To Thrive In The Next Economy. His previous books (among twelve in total) were Wouldn't It be Great If... and In the Bubble: Designing In A Complex World (MIT Press). At the time of the conference, John is visiting professor at Tongji University with a focus on urban-rural reconnection; a senior fellow at the Royal College of Art; a Fellow of Musashino Art University in Japan; and visiting professor at Milan Polytechnic University.

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This 2023 edition of the E&PDE conference was made possible through the commitment and efforts of many people. We would like to thank Jo Winslow, Nadine Pearce, Lyndon Buck, Erik Bohemia, Hillary Grierson and Ross Brisco for their very effective and helpful collaborations.

Thank you to all the members of the international academic review board who contributed to ensure the quality of the papers and presentations and of course all colleagues and students at the ELISAVA, Barcelona School of Design and Engineering, UVIC-UCC, that contributed to the planning and running of the conference.

Professor Isabel Ordóñez Pizarro – Industrial Design Engineer, PhD
Teacher and Researcher at ELISAVA, Barcelona School of Design and Engineering, UVIC-UCC
6th of September, 2023

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Established in 1945, Incorporated by Royal Charter in 2012, the Institution of Engineering Designers is the premier organisation in the UK to represent those working in the many fields of engineering and product design.

Our members enjoy a range of benefits, including mentoring and guidance to professional registration, exclusive access to our job board and newsletters to keep members up to date with relevant developments and events. We host regular events which offer our members the chance to network with other professionals and members receive the Institution's bi monthly journal – Engineering Designer.

We are committed to encouraging CPD for all our members and support ongoing training and skills development.

We offer a wide range of professional registrations: our own register for professional product designers includes the exclusive Chartered Technological Product Designer (CTPD) which is on a par with all other Chartered registrations and exists to provide professional recognition and standing to those suitably qualified and competent persons working in Product Design, with the sister grade of Registered Product Designer (RProdDes) for those not working at Chartered level.

We are licensed by the Engineering Council to assess candidates wishing to join the register of Professional Engineers and Technicians and we also accredit academic and training courses, for registration with either the Institution or with the Engineering Council. Those members who achieve the appropriate academic and competence standards receive Chartered Engineer, Incorporated Engineer or Engineering Technician status.

We are also a licensed body of the Society for the Environment and are able to register suitably qualified and competent members as Chartered Environmentalists (CEnv).

We welcome members from any organisation that has a design function and employs design engineers and we have many academic teaching staff in membership. To find out more about becoming a member of the IED and a professional registered designer go to http://www.ied.org.uk

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The Design Society is an international non-governmental, non-profit making organisation whose members share a common interest in design. It strives to contribute to a broad and established understanding of all aspects of design and to promote the use of results and knowledge for the good of humanity.

The Design Society was founded in 2000, taking on the previous activities and responsibilities of the Workshop Design Konstruction (WDK) Society, especially the organisation of the International Conference on Engineering Design (ICED) series of conferences, which had been running since 1981. Since 2000 the Society has organised ICED conferences in Stockholm, Melbourne, Paris, Stanford, Copenhagen, Seoul and Milan. The upcoming 2017 conference will be hosted in Vancouver.

The Society has members from over forty countries and it organises very popular events such as the Engineering and Product Design Education conferences and the International Conference on Design Creativity among many other activities. The Society is very active in publishing papers and proceedings on design topics, and it has a developing portfolio of other design resources available to members including a repository of theses and collaborative agreements with a number of design research journals.

The Design Society concentrates on activities that transcend national boundaries, and, where possible, will seek to complement national activities. The objects of the Society are to promote the development and promulgation of understanding of all aspects of design across all disciplines by:

- Creating and evolving a formal body of knowledge about design
- Actively supporting and improving design research, practice, management and education
- Promoting co-operation between those in research, practice, management and education
- Promoting publications and their dissemination
- Organising international and national conferences and workshops
- Establishing Special Interest Groups and other specialist activities
- Co-operating with other bodies with complementary areas of interest

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25TH INTERNATIONAL CONFERENCE ON ENGINEERING AND PRODUCT DESIGN EDUCATION
7-8 SEPTEMBER 2023, ELISAVA UNIVERSITY SCHOOL OF DESIGN AND ENGINEERING, BARCELONA, SPAIN

INVESTIGATING THE PERIMETER OF INNOVATION IN DESIGN EDUCATION THROUGH MAPPING OF EXPERIMENTAL PRACTICES

Andrea TAVERNA, Andrea MANCIARACINA, Laura CIPRIANI and Francesca MATTIOLI
Design Department, Politecnico di Milano, Italy

ABSTRACT
The term "innovative didactic" often describes the notion of a cultural and epistemological shift that can transform teaching and learning practices. Notably, the instructional design innovation implies a shift from traditional ex-cathedra teachings towards more active student engagement in the learning process. Recently, the pandemic and digital transformation have been among the main factors that have propelled the conversation about this topic. Design has always explored innovation in its didactics. By its very nature, design-based learning provides a teaching environment that places students at the heart of the learning process. There may be examples of these creative teaching approaches in the design literature. Still, no significant research exists on how design schools manage and monitor the teaching innovation process. Hence, this paper describes a funded research project "Innovation in Design Teaching", which aims to investigate the boundaries of innovation in design education in a situated context such as the School of Design in Politecnico di Milano. The study comprehends two research activities: the first is a survey delivered to every lecturer at the school in an effort to map the experimental approaches in the courses during the past decade, while the second one comprehends two sets of interviews. This paper summarizes the findings of the second research activity. The research contributes to understanding how experimenting happens in design schools and how this might contribute to didactic innovation. Hence, it provides a series of protocols that might be used in other contexts to expand the scope of the research.

Keywords: Design education, innovative didactics, experimental practices, instructional design, educational research

1 INTRODUCTION
Innovation of didactic is an increasingly strategic goal for universities to equip students with the right competencies for modern, complex challenges and continuously changing working contexts. Universities need to cope with preparing learners for jobs that still don't exist and be competitive towards emerging players in education and training [1]. In addition to the changing socio-economical working context, innovation in teaching practices is also affected by the historical transition from an objectivist to a constructivist perspective in learning science [2], [3]. Specifically, this shift informed the instructional design process suggesting moving from the conventional ex-cathedra lectures to a more active involvement of students in the learning process. More broadly, the research in this field aims to experiment with new educational practices and methodologies that relate pedagogy, space, and technologies and reflect on the synergies of the different elements with the users [4].
The formal acknowledgment of design education has its roots in the Bauhaus School, which aimed to teach design at the intersection of art, technology, and science [5]. The Bauhaus School's teaching methodology was derived from architecture and centred on the design studio and the project [6]. The design studio is a physical and interactive place where students may create design projects via interaction with other students and actual materials [7], [8]. Within this setting, the learning activity usually is driven by project-based learning. In project-based learning, students actively engage with actual, open-ended challenges and generate solutions via actions and reflections [9]. Thus, design-based education offers a teaching setting that places the students with an active role at the centre of the learning process and is open to integrating experimentation in the didactic. Examples of these innovative teaching practices

might be found in design literature. Still, there is a lack of extensive studies on how the teaching innovation process emerges and how these are being handled and tracked by design schools.
Within the described context, the research projects focused on mapping already implemented experimental teaching practices in the context of the School of Design of Politecnico di Milano to comprehend how these might inform new didactic practice in design education and translate into instructional design innovation. The experimental teaching practices during the research project have been analysed across 9 components that, according to Tassone et al. [10], help understand innovation as intended and implemented. These are the course-innovation characteristics adapted by Van Den Akker [11] curriculum components. The components described in table 1 in the methodology are the following: Rationale, Objectives, Content, Activities, Material and resources, Grouping, Location, Time, and Assessment. These interconnected components must be balanced for effective teaching practice implementation or redesign. Moreover, Van Den Akker [11] highlights how the relevance of the previously mentioned components varies according to the level at which it is discussed. In this regard, he outlined the following levels: a) macro level (i.e., society/state), b) meso level (i.e., school, institution), micro level (i.e., classroom/course), and d) nano level (i.e., individual).

Table 1. Components conceptual model was originally proposed by van den Akker [6] and then simplified by Tassone et al. [8]

Codes	Description
Rationale	We aimed to change the reasons why students learn
Objectives	We aimed to change the objectives towards which students learn
Content	We aimed to change what students learn (e.g., theories, skills)
Activities	We aimed to change how students learn (e.g., lectures, fieldwork)
Materials and Resources	We aimed to change with what students learn, both considering resources in i) digital format (e.g., video clips); ii) non-digital format (e.g., articles)
Grouping	We aimed to change with whom students learn (e.g., alone, in groups)
Location	We aimed to change where students learn (e.g., home, classroom)
Time	We aimed to change when students learn (e.g., prior to class, after class)
Assessment	We aimed to change how students are assessed (e.g., multiple-choice tests, field performance)

The first research activity focused on the micro level to analyse the teaching practice, while the second research activity expanded towards the meso level to comprehend how these two levels are related.
The data collected disclosed that various experiments are currently running in the context of the study, and they could contribute to understanding how design teaching and learning are recently evolving. In conclusion, the investigation developed in our situated context contributes to the discussion of understanding how experimentation in design courses can bring the innovation of didactic.

2 METHOD

The paper is based on a funded research project, Innovation in Design Teaching, to investigate the perimeter of innovation in design education. The research focuses on the situated context of Politecnico di Milano to comprehend how experimentation in university courses can lead to the innovation of design didactics. The study focuses on teaching practices, which are "the specific actions and discourse that take place within a lesson and that physically enact the approach and strategy" [12]. During the project, two activities were carried out: The first was a survey, briefly described, sent to all the lecturers at the School of Design of Politecnico di Milano, which aimed to map the experimental practices in the courses in the last decade. The second is composed of two sets of interviews. One set is a follow-up of the practices collected, and the second set is to relevant actors in the didactic organization to comprehend how the ecosystem can enable these experimentations. This paper intends to present the results of the interviews.

2.1 The survey

The primary research activity that has been carried out for the study has been the collection of past experimental teaching practices undertaken at the School of Design at Politecnico di Milano and their qualitative analysis. The purpose of the data collection was to reveal which experimentations were done in the study context and how these activities were presented. In June 2022, a survey was distributed to all lecturers at the School of Design to collect teaching practices. The lecturers were asked to reflect on the experimental didactic activities they developed. The obtained data served as the basis for the context-

based mapping of experimental teaching techniques and implemented innovations [10]. The survey had three sections: the first aimed to comprehend the respondent's role, the second to illustrate the context (i.e., the course in which it was delivered), and the last section focused on the teaching practice. This last section had a first block to describe the didactic activity and a second to self-evaluate the practice according to nine components based on the Tassone et al. [10] revisited version of Van Den Akker et al. [11] curricular spiderweb (Table 1). This model has been chosen for its relevance in the context of instructional design and serves as a framework for the development of didactic across different levels. After being sent to more than 500 professors, 47 individuals responded to the poll. The majority of participants (n=42) mentioned only one teaching practice, a few described two (n=4), and one person detailed all three. 53 experimental teaching approaches were gathered and analysed in total.

2.2 The interviews

The second research activity that has been carried out for the investigation has been two sets of qualitative interviews. The first set aimed at deepening some relevant didactical experimentation, gathering further insights from the teaching team that proposed it, thus focused on the "micro" level (i.e., the level of the courses in which didactic activities are delivered). The second set of interviews aimed at comprehending the larger context in which these activities take place involving different points of view, thus focused on the "meso" level (i.e., the level of the school and the university, in which the didactic system is organized). Interviewees were selected using a "purposive sampling strategy" [13]. This strategy ensures the inclusion of specific categories of participants that may have an exceptional, distinct, or significant perspective on the phenomenon being studied (Table 2)

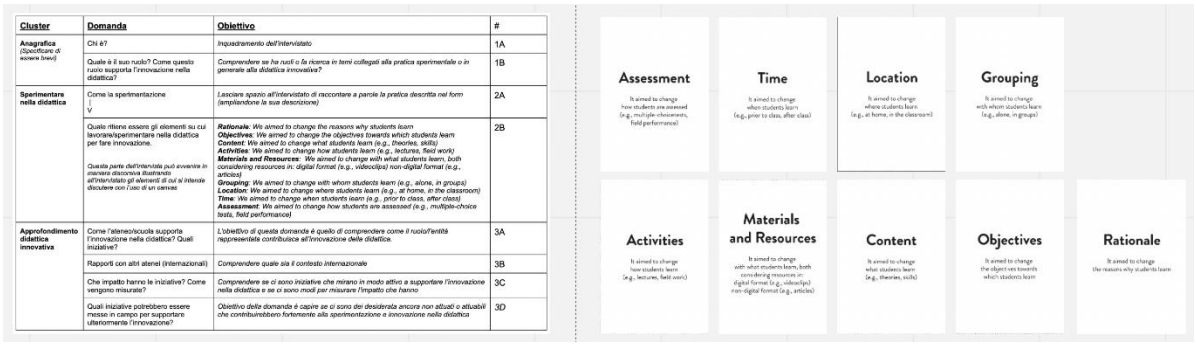
For the first set of interviews, the research team selected 7 teachers from the 53 respondents of the survey, looking for heterogeneity in the type of courses, diversity in the number of participating students, and variety in the disciplines covered. For the second set of interviews, the research team engaged 5 key players involved in organizing and developing the didactic offer to provide an overview of the didactic innovation trajectories within the Politecnico di Milano. Therefore, the interviewees for this set were: the previous Dean of the School of Design, the previous vice-dean and now current Dean, the director of the center for didactic innovation "METID", the didactic Delegate of the Department of Design and the rector's Delegate for didactic innovation.

Table 2. Interviewee overview

Micro Level	Interviewee Micro 1	Location, Activities
	Interviewee Micro 2	Activities, Assessment
	Interviewee Micro 3	Activities, Assessment, Content, Material and Resources
	Interviewee Micro 4	Activities, Assessment, Material and Resources
	Interviewee Micro 5	Grouping, Material and Resources, Assessment, Activities
	Interviewee Micro 6	Time, Location, Activities, Content
	Interviewee Micro 7	Activities, Rationale
Meso Level	Interviewee Meso 1	Current Dean (previous vice dean)
	Interviewee Meso 2	Previous Dean (during pandemic)
	Interviewee Meso 3	Head of innovative didactic Service
	Interviewee Meso 4	Rector's Delegate didactic
	Interviewee Meso 5	Design Dept's delegate didactic

The interviews were carried out by at least two research team members and lasted approximately 30 minutes each. Some interviews were done as web-call, while some happened in presence. In both cases, the protocol followed was the same. The protocol comprised questions and a series of cards (Figure 1). Moreover, the interviews have been designed with a semi-structured protocol to foster teachers' narratives of their experimental practices. The questions were structured into three sections: the first focused on framing the interviewee, the second on experimental practices, and innovating in didactic. The second section was based on the components previously presented. During this interview phase, the respondent was supported by using 9 cards based on the framework based on the conceptual model

initially proposed by van den Akker [11] and then simplified by Tassone et al. [10]. The third section aimed at comprehending the relationship between experimental practices and didactic innovation. The questions vary according to the type of subject interviewed: more focused on the teaching experience for the first set of interviews (micro level) and more oriented on vision strategies and innovation trajectories for the second set of interviews (meso level). For instance, in the discussions with the key actor of the didactic system, the questions were not focused on a specific experimental practice but on how the system leverage on each component to innovate didactic.



Cluster	Domanda	Obiettivo	#
Anagrafica (Specificare di scuola tratta)	Chi è?	Inquadramento dell'intervistato	1A
	Quale è il suo ruolo? Come questo ruolo supporta l'innovazione nella didattica?	Comprendere se ha ruoli o fa ricerca in temi collegati alla pratica sperimentale o in generale alla didattica innovativa?	1B
Sperimentare nella didattica	Come la sperimentazione ↓ V	Lasciare spazio all'intervistato di raccontare a parole la pratica descritta nel form (ampliandone la sua descrizione)	2A
	Quale ritiene essere gli elementi su cui lavorare/sperimentare nella didattica per fare innovazione. Questa parte dell'intervista può avvenire in maniera discorsiva illustrando all'intervistato gli elementi di cui si intende discutere con l'uso di un canvas	**Rationale**: We aimed to change the reasons why students learn **Objectives**: We aimed to change the objectives towards which students learn **Content**: We aimed to change what students learn (e.g., theories, skills) **Activities**: We aimed to change how students learn (e.g., lectures, field work) **Materials and Resources**: We aimed to change with what students learn, both considering resources in: digital format (e.g., videoclips) non-digital format (e.g., articles) **Grouping**: We aimed to change with whom students learn (e.g., alone, in groups) **Location**: We aimed to change where students learn (e.g., at home, in the classroom) **Time**: We aimed to change when students learn (e.g., prior to class, after class) **Assessment**: We aimed to change how students are assessed (e.g., multiple-choice tests, field performance)	2B
Approfondimento didattica innovativa	Come l'ateneo/scuola supporta l'innovazione nella didattica? Quali iniziative?	L'obiettivo di questa domanda è quello di comprendere come il ruolo/l'entità rappresentata contribuisca all'innovazione della didattica.	3A
	Rapporti con altri atenei (internazionali)	Comprendere quale sia il contesto internazionale	3B
	Che impatto hanno le iniziative? Come vengono misurate?	Comprendere se ci sono iniziative che mirano in modo attivo a supportare l'innovazione nella didattica e se ci sono modi per misurare l'impatto che hanno	3C
	Quali iniziative potrebbero essere messe in campo per supportare ulteriormente l'innovazione?	Obiettivo della domanda è capire se ci sono dei desiderata ancora non attuati o attuabili che contribuirebbero fortemente alla sperimentazione e innovazione nella didattica	3D

Figure 1. Interview tools used in MIRO

3 RESULTS: EMERGING PATTERN

As presented in the methodology as part of the interview protocol, the interviewee had to discuss various components of the conceptual model used as a framework. The two different sets of actors during the conversation tend to focus on specific components. While professors interviewed for their experimentation at the micro level discussed the activities and their related elements (i.e., material resources, grouping, time and location, assessment). On the other hand, the actors involved at the meso level focus the discussion on the reasons why students learn (e.g., the rationale) and their related objectives.

3.1 Micro level: leverage on students' learning experience to experiment

As emerged as well in the analysis of the survey answers [14] the description of experimental teaching practices has a preponderance of focus on how students learn (code: activities) as a central component in experimentation. Indeed, during the interviews, it appears that often acting on the didactic activities, therefore "changing how students learn," implies leveraging on other components. For instance, introducing peer-to-peer evaluation in a course to change the learning dynamics of the course, it impacts as well on how students are assessed.

> *"To evaluate their peers, they must know the topics on which they are expressing feedback" [interviewee 2]*

Regarding the assessment components, an emerging pattern is experimentation in various forms of peer review or peer assessment [interviewees 2 and 6], where the teacher facilitates the process.

> *"Building the evaluation form for peer reviews is challenging, but it is the most important thing as you need the most objective parameters to evaluate and how much weight to give to each part to evaluate" [interviewee 2]*

Another example of overlap between components is the grouping, which in project-based learning impacts both on how the didactic activity is carried out but as well with whom students learn. Within this area, it emerges that sometimes experimental practices aimed to balance team competencies to create.

> *"Through a self-assessment of hard and soft skills, we aimed to create groups that theoretically have team members with different strengths" [interviewee 5]*

Within this practice, many other elements of experimentation aim to put the students at the center of the learning experience using the constant feedback form to comprehend the understanding of the students and integrate with additional material and resources (i.e., documentary, blogpost) of contents that might be of interest to the students, but that is not in the syllabus of the course. Regarding the components of time and location, although the covid-19 pandemic pushed to reflection on these themes in terms of learning from home and asynchronous, experimental practices also leverage these elements in terms of bringing into the class personal experiences and informal learning. It is the case of an experimental practice

[interviewee 6] in which students were asked to keep a diary and report seven cultural events (i.e., exhibitions and concerts) from the design perspective. Finally, another pattern that emerges is the concept that innovation in didactics doesn't come only from implementation of cutting-edge technologies but also from economic choices using the few materials or the classroom arrangement to immerse students in the learning experience. It is the case of interview 1, where interior design students, to learn how the influence of a specific setting might influence interactions, discuss a series of educational materials using the arrangements of the chairs of different parliaments in the world. In this case, the innovation leverages how students comprehend the lessons besides being told during a frontal lecture.

3.2 Meso level: creating the condition to enable experimentation and innovation

During the interviews, it was possible to comprehend the relation within the didactic system taken in the analysis. This context has different actors that serve different purposes:

- The university: which coordinates the various actors and the relation between them.
- The school: which coordinates a set of programs of a specific area of study (i.e., design)
- The department: which coordinates the research over a specific discipline (i.e., design)
- The METID: a unit with the role of researching tools and methods to innovate didactic.

The university has a delegate to the didactic, which has the high-level goal to elaborate strategies to comprehend how students' learning is changing, training teachers and providing them the tools to experiment and develop new spaces for didactic. This actor often has the role of interpreting and anticipating how the rationale and objective components of didactic are changing. Nevertheless, it has as well the role of defining policy and providing infrastructure that incentive the possibility to experiment. It is the case of "Passion in action", an extra-curricular and interdisciplinary activity format that allows teachers and students to experiment. Indeed, students can follow activities that are based on their interests, even if these are not part of the subject of their program. At the same time, teachers have less constraint in defining the didactic activity since it is not curricular [interviewee meso 4]. Regarding the infrastructure, in collaboration with the METID the university developed six classrooms that encourage an active and collaborative approach through technology, furniture, and infrastructure to support the didactic. The School of Design is an intermediate actor between the university and the teachers and defines strategies discipline-related to better comprehend how to facilitate the professors in experimenting. This actor contributes to the reflections with the university on the changes to rationale and objectives components, and given the subject-specific role (i.e., design) it reflects as well on content components. During the pandemic, for instance, the Dean of the school was part of a task force that focused on didactic advocating for the need of design students [interviewee meso 2]. In this regard, on Dean's mandate, a working group foresaw future didactic scenarios for post-pandemic design education contexts [15].

> *"The role of the Dean is on one side to coordinating the head of the programs, supporting and stimulating the colleagues to bring some sort of innovation to didactic and on the other side confront with the university strategies" [interviewee meso 1]*

Within these relations, two other actors support the process; on one side, the Delegate to the didactic of the Design Department aims to harmonize the research process with the didactic ones. On the other side, the university has a unit that studies tools and methods to innovate didactic. The process of harmonization managed by the Delegate to didactic within the Design Department leverages content components, ensuring that the research expertise coincides with the didactic tasks [interviewee meso 5]. The function of the METID concerns mainly components such as activities, materials, and resources. Moreover, working on methods of learning inform components such as assessment, grouping, and time. Lastly, as mentioned before, it studies technologies shaping how a classroom is equipped.

> *"The aim of the unit is to keep together spaces, methodologies and technologies […] to answer to the challenge of innovating the university didactic" [interviewee meso 3]*

4 DISCUSSIONS

The interviewees with lecturers and with the key player in the instructional system allowed the research group to understand the relationship that enable experimentations in didactic to happen and which are emerging pattern of investigation within the studied context. The limits of this study and particularly on the emerging patterns, are linked to the small sample of teaching practices considered; nevertheless, the reflections on the relations between the meso and micro levels are not impacted by the number of interviews. Moreover, the investigative field that is considered focus only one school, this could be

extended in future studies, nevertheless the dimension of the school and its global position across academic ranking create a first exemplary pilot study to further explore.
The analysis of the result provides an empirical confirmation to Van Den Akker ideas that the didactic components are mixed at different levels [11], meaning that each level leverages and influences certain components. Observing the teaching practices taken in exams, the central transversal aspect in the experimentation is a shift in the attention toward students' learning experiences. This shift represents a new role of the teacher, from a traditional position in which one owns the knowledge of the subject to a more modern perspective in which the teacher becomes a facilitator providing a compass to students to navigate within the knowledge and assumes the role of a designer of the didactic activities where students are the central user [16]. It is important to underline that the new role of the teacher is strictly connected with its training as instructional designer [17]. This trend is embodied, for instance, in the emergence of peer review practices or the integration of new materials based on students' feedback. Furthermore, from the second set of interviews emerged the relationship across the didactic system, where the meso level enables the micro level to experiment with various didactic practices inside and outside the curriculum. Marginal to the interviews, it appears that micro and meso levels are limited to a certain extent by a policy defined at the macro level (i.e., state policies). Therefore, many experimentations of didactics are developed through extra-curricular activities, nudged, and supported by several actors.

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