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PREFACE

Smart Learning Ecosystems beyond 2030.

This is a very special issue in the history of IxD&A journal because it carries a message to future generations that is also intended to be a legacy “in progress” - to be shaped over time - that contains operational guidelines to support the development of smart learning ecosystems till and beyond 2030. The message, composed of the Timisoara [1] and Troyes [2] (Timisoara 2.0) declarations, is the result of work shared among many colleagues and associations who are signatories of such declarations.

The effort to produce the first of these declarations was carried out in late 2015 and refined in the early 2016 for its presentation in Timisoara at the first edition of the annual conference of ASLERD [3] (SLERD [4] 2016, organized by Radu Vasiu and Diana Andone. An effort that was conducted in parallel to the definition of the SDGs by the UNESCO that included also SDG 4 [5] aimed at ensuring access to quality, equitable and inclusive education for all, a sine qua non for promoting sustainable development. Pivotal to the SDG 4 is the provision of adequate places for learning processes, and teachers with appropriate skills to provide quality education and equal opportunities for all. These are all themes that, in various ways, also resonate in the Timisoara declaration, but the latter, unlike SDG 4, addresses the issue of learning from a systemic perspective by hinging the vision on future learning in smart ecosystems, i.e. complex ecosystems composed of places, actors, processes and technologies, in osmosis with the social context towards which they act as an engine of innovation and social justice. And in doing so, the declaration identifies the features that underlie and give meaning to the term "smart" and, thus, helps to define a framework within which the degree of smartness of a learning ecosystem can be defined or, equivalently, the wellbeing generated by the ecosystem in the actors of the learning processes: students, faculty, parents, territorial stakeholders and society as a whole.

These include: the need for collaboration among traditional educational agencies, contextualized to territorial needs; the relevance of competencies and of design thinking; open access to infrastructures, technologies, contents and competencies; continuous training of all actors of the educational process also with the aim to sustain social inclusion, civic participation, community identity and social cohesion; the development of an entrepreneurial, lifelong, lifewide and lifedeep learning mind-set.

Despite the robustness of the operational framework described by the Timisoara Declaration, the events of recent years (the pandemic, the advent of climate crisis and of artificial intelligence) unavoidably had an impact on the vision contained therein and lead to its revision to provide an even more robust framework that could be still

useful well beyond 2030. Many months of work and consultations with signatory associations within the IAALDE [6] context led to the Troyes Declaration (Timisoara 2.0) presented at SLERD 2024, organized by Ines Di Loreto. Among the additional contents of version 2.0 of the declaration: the inalienable right of the individual to have access to technologies to avoid the establishment of new inequalities; the 'wellbeing' as ultimate aspiration for students, teachers, and stakeholders actively involved in educational processes; the underlining of the close link between a competencies based didactics and 'learning by being'; the responsible use of technological and natural resources; the need to develop a responsible interaction and cooperation with the artificial intelligences; the need to rethink the physical spaces to adapt them for technologically augmented educational processes aimed at 'learning by being'.
The writing of the declaration 2.0 was anticipated by an Open Debate [7] in which some representatives of the signatory associations participated. The Debate was held at SLERD 2023. The echoes of their interventions reverberate in the stimulated papers and commentary contained in this issue and help to understand how some issues can be declined in the context of smart learning ecosystems (SLEs). Indeed, SLEs are potentially ground for the development of methodologies, technologies and social innovations: for example, the use of analytics applied to the monitoring of learning but also to the assessment of the ecosystem smartness; the role of design; the use of microcredits and e-certificates anchored to blockchain; the transformation of teaching and learning processes following the introduction of AI; the experimentation on phygital spaces; the development of territorial networking and social innovation.
Examples of possible developments and of the work already underway can be found both in the stimulated contributions and in the articles selected as a result of the review process.

The paper "Grand Challenges in AI and Education Beyond 2030" [8] by Beverly Woolf, Danielle Allessio, Sai Gattupalli, Injila Rasul, William Lee, Ivon Arroyo, points out how the usage of AI requires new skills to be developed by learners, so to be able to augment their capabilities and perform jobs with more efficiency and effectiveness. To this aim, the paper lists eight grand challenges for AI in education, addressing promises and risks, suggesting problems to be addressed, and visions to foster. Ethical problems related to AI usage and the possibility that inequalities among students shall be exacerbated are also discussed.
The paper "Trustworthy Learning Analytics for SLEs" [9] by Barbi Svetec, Blaženka Divjak address the problems of trustworthiness of LA, a concept still needing clarification in order to help developing SLEs of the future. To this aim, the authors conducted a scoping literature review, then grouping identified dimensions into social and technological aspects, with some considered related to both issues. After such

analysis, a comprehensive definition of trustworthiness is provided, and open challenges are pointed out.

The commentary "Investigating Diverse Research Orientations in Smart Learning Ecosystems: Uncovering Positive and Negative Impacts on Learners' Learning Smartness" [10] by Lung-Hsiang Wong summarizes some approaches contributing to defining the future of SLEs using the three lenses of: Dream-based research, Adoption based research and Humanity based research, each of them with pros and cons. However, following new trends should not make us forget the important lessons of the past, and specifically the learners' centered approach, their active engagement, and their empowerment. In the author's opinion, future trends should be based on the distinction between adaptability and adaptivity, and on a balanced use of them by establishing suitable borders, possibly varying over time in accordance with learners' learning progress and autonomy.

The paper "Phygital learning ecosystems and places beyond 2030" [11] by Carlo Giovannella & Giuseppe Roccasalva provides a cultural reference framework for designers of tomorrow's SLEs. It contains a critical analysis on how learning environments have evolved over time, and a definition of "smartness" in LEs that is based on development of competences by learners, and wellbeing of involved actors. Cultural paradigm, pedagogical framework, and didactic approach are discussed; guiding principles and qualities that shall be adopted can be summarized in the term "Phygital", indicating physical spaces that are integrating new digital technologies.

The paper "The value perspective of technologically disrupted social dimension of a learning space" [12], by Andrea Annus, Kai Pata, Terje Väljataga, Halliki Põlda, investigates the social dimension of a learning space supporting adult education practices. The investigation took place within group-interview workshops, involving learners, facilitators and educational technologists. The outcome of this research shows that disruptive technologies enhance engagement, interactivity, effectiveness empowerment and empathy within a learning space; they also have a potential for enhancing accessibility, autonomy and equity. The downside of such technology is in privacy, surveillance, trust and coercion, that may rise questions about their use in a SLE.

The paper "More-Than-Human-Centered-Design and Self-Narration as Catalysts for fostering Sustainable Learning Ecosystems" [13], by Eugenia Rosina, Francesca Mattioli, presents an exploratory study for self-narratives, in the context of design education, and in the perspective of more-than-human-centered design, as opposed to the usual perspective of human-centered design. The latter may in fact restrict contributions to professional identity construction, in a future work environment where symbiotic relationships with non-humans may become commonplace. Exercises of self-narration involving non-human elements were thus the means of the study, aimed at raising awareness of shared agency and interconnectedness with non-humans.

Finally, the paper "Higher visual art education objectives and teaching patterns to reach them" [14], by Antonina Korepanova and Kai Pata, surveys current trends in literature about teaching visual arts in e-learning environments, by analyzing 48 research papers and interviewing 24 educators from different countries. Different teaching objectives, and different teaching patterns to achieve them, were identified; then, a visual tool was developed to categorize them as a possible help for teachers to plan their e-learning courses in accordance with their specific course objectives.

Overall, these contributions show how much the development of SLEs depends on contributions of various natures that must find common ground and ways of integration and, therefore, how useful the vision, the cultural framework and the related guidelines offered by the Timisoara and Troyes declarations are. At the same time, it makes clear how these declarations should be seen as a living legacy prone to potential modifications and additions that may become necessary as a result of evidences that may emerge from field work done to develop future SLEs.

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More-Than-Human-Centered-Design and Self-Narration as Catalysts for Sustainable Design Learning Ecosystems

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Abstract. This paper presents an exploratory study on approaches to the designer's self-narration from a more-than-human-centered perspective. It aims to offer new perspectives on professional identity construction and sustainable design practices within design education, while encouraging reflection on the contemporary role of designers. In response to the complex transformations of the 21st century, the paper argues that the widely established human-centered approach fosters an anthropocentric perspective which constrains designers' self-identification and hinders diversity and inclusiveness in design practices. Emphasizing the need for competencies that encourage symbiotic relationships with non-humans, the study introduces self-narratives as a tool for sustainable design learning ecosystems. A prototype activity, rooted in instructional design, is proposed to facilitate professional identity construction and relational perception development. Through exercises of self-narration in relation to non-human elements, the activity offers participants reflection opportunities that facilitate professional identity formation while raising awareness of interconnectedness and shared agency between humans and non-humans.

Keywords: Identity construction, Self-narration, Instructional design, More-than-human-centered-design, Design education and training.

1 Introduction

Living in the 21st century entails facing some of the most profound social, cultural, economic, technological, political, and environmental transformations of all time. Globalisation and digitization are reshaping economies and international relations, while technological advancements are rapidly transforming social systems in

intricate and multifaceted ways. Although these changes may promote opportunities and economic growth, they also widen the gap between the wealthy and the impoverished, creating economic uncertainties and exacerbating resource disparities, which are further aggravated by the escalation of climate change and environmental degradation [1][2]. In light of this context, it becomes imperative to embrace lifestyles in harmony with nature, support care for the planet and its living beings, and deeply acknowledge the interconnectedness of humans with other non-human, all of which share agency within the ecosystem. Addressing these challenges requires a multifaceted approach that promotes environmental, economic, and social equity while ensuring that technological advancements, such as AI, are harnessed in ways that benefit the environment and all members of society This entails acknowledging the reciprocal agency of humans and non-humans and preserving critical thinking to stop inequality from continuing. However, putting these concepts into practice proves to be more difficult than discussing them. Facing the complexity of these changes requires humankind to acquire knowledge, skills and attitudes that extend far beyond what it is used to. While the collapse of traditional social frameworks compels individuals to autonomously construct their realities amidst unpredictability [3][4], conventional learning systems reliant on the objective transmission of knowledge prove obsolete in fostering the essential skills required in this changing landscape [5].

In the design education field, this is particularly challenging for novice designers and professionals, who are forming their own professional identities and developing design practices that can address socio-environmental problems in line with the 2030 Global Sustainability Strategies [6]. To develop diversified and sustainable design practices, designers must be not only flexible, open, and self-aware to navigate an unstable workforce [7] but also able to individuate and internalize the interconnected collaboration of humans and non-humans acting within the project's contextual frame. The limitations of the current human-centered design paradigm in addressing these issues - which frequently place human needs and desires above those of other living forms [8] - makes it evident that new design learning approaches are necessary to navigate these dynamics. This emphasises the importance of reimagining design education through a more competence-based approach that values relationships and shares agency between humans and non-humans, aligning with the evolving vision for people centered Smart Learning Ecosystems outlined in the *Timisoara Declaration* [9] and reinforced by the current reflections of the *Troyes Declaration (Timisoara 2.0)* [10]. In these intents, global strategies are emerging to support the development of essential skills, such as the European Union's investment in lifelong learning strategies [11][12], while new systemic design approaches like more-than-human-centered design are being recognized for their ability to address the interconnectedness of humans and non-humans.

In broadening the discussion regarding future Smart Learning Ecosystems beyond 2030, the paper presents a study that investigates the potential of self-narratives in promoting designers' professional identity construction while fostering the development of relational perceptions through a more-than-human-centered design perspective. The contribution focuses on theoretical connections to generate new perspectives supporting inclusive, holistic, and sustainable approaches to professional and design educational development. The first section provides a review of the relevant literature, covering key concepts related to self-narration, identity construction, and the more-than-human-centered design approach. This sets the stage for exploring self-narratives' role in design education through the lens of instructional design. Then, the empirical application of the instructional design project as a proof of concept is intended to break new ground in educational methodologies and offer insights for further research. Based on a qualitative interpretive analysis of the results, the closing key findings and reflections disclose the implications for design education and the development of Smart Learning Ecosystems.

2 Background knowledge

2.1 Identity Construction in the 21st Century and Narrative Identity

The global transformations of the 21st Century have changed society enormously, making it fluid [3] in the sense that social forms such as relationships, identities, organisations, and global economies are constantly subject to change and cannot persist in any form for an extended period [5]. As a result, a growing individualisation and fragmentation of society have taken place, which, unsupported by the past's strong social, cultural, organisational and ideological models, brought out its multiple identities, roles and differences [13].

> *Individuals increasingly emerge as possessors of many voices. Each self contains a multiplicity of others, singing different melodies, different verses, and with different rhythms. Nor do these many voices necessarily harmonise. At times they join together, at times they fail to listen one to another, and at times they create a jarring discord [13].*

In the multitude and diversity, synchrony and dissonance of these voices, the construction of people's identities has consequently undergone a substantial change. Stated that identity is "an individual's sense of self defined by (a) a set of physical, psychological, and interpersonal characteristics that is not wholly shared with any other person and (b) a range of affiliations (e.g., ethnicity) and social roles" [14] -

with unstable and constantly changing social structures and roles, people have been forced to rely primarily on themselves to construct their realities. In this process, defined as a "reflective organised endeavour" [4], people must continually reflect and re-identify themselves, trusting the direction of their lives to their self-knowledge to achieve their goals and cope with modern contingencies and problems. Hence, to favour the evolution of the self over time, people need to build purpose and meaning in life, which is related not only to greater happiness and mental well-being [15][16] but also to self-fulfilment on an individual and social level. Humans' underlying motivator in life is indeed a "will to meaning" [17], and they need meanings in life to act, choose, and imagine as meanings represent "possibilities for action" [18]. It emerges that identity construction in the 21st Century involves a combination of strengthening personal resources, such as self-reflection [19] and self-reflective consciousness [20], as well as meaning-making, which is the process by which people interpret events based on their prior experience and knowledge [21]. In this sense, narratives and storytelling can reinforce these cognitive processes. Indeed, personal and social identity is widely constructed through narrating our lives [22], as stories enable individuals to construct, share, and apply their experiences to enhance their understanding of identity formation [23][22]. As a result, in recent decades, the theory of narrative identity [24] has gained prominence, positing that personal and social identities are largely constructed through the act of narrating our lives. The narratives we tell about ourselves, both to ourselves and to others, help create and maintain our identity and outline future developments and perspectives in life. Narrative identity indeed:

> *reconstructs the autobiographical past and imagines the future in such a way as to provide a person's life with some degree of unity, purpose, and meaning. Thus, a person's life story synthesises episodic memories with envisioned goals, creating a coherent account of identity in time. Through narrative identity, people convey to themselves and to others who they are now, how they came to be, and where they think their lives may be going in the future [24].*

Narratives function as tools for co-constructing reality and shaping identity through dialogues and stories, serving as both reactive and anticipatory mechanisms for creating meaning and self-structure. In narrative psychology, self-narratives offer significant potential in fostering personal volition, which is highlighted as a central theme in life stories that promote psychological adaptation, resilience to adversity, and psychological well-being [24]. These considerations have driven the emergence of specialised branches and subfields in the realm of psychology in recent times. In particular, the Life-Design paradigm of career guidance aims to help individuals construct a comprehensive work history through self-narratives by integrating adaptive responses, facilitating the accomplishment of developmental

tasks and effective navigation of life transition aligned with personal goals [7]. Through counselling dialogues and self-narration exercises, counsellors facilitate individuals' empowerment, allowing them to adapt and reconstruct their personal ecosystems by creating their own norms and finding meaning in their lives [25][7]. This approach fosters reflexivity, aiding individuals in constructing their norms and facilitating empowerment and adaptive reconstruction of personal ecosystems.

It thus emerges that by crafting a narrative that reflects individuals' unique values, interests, and aspirations, people can cultivate a sense of agency and self-determination that can aid them in navigating life transitions and achieving personal fulfilment in the uncertain context of the 21st century.

2.2 Identity and Self-Narration in a More-than-Human World

The design field has also been profoundly impacted by the 21st-century transformations, presenting practitioners with complex ecological and social challenges. In light of these changes

> *designing, in the broadest definition of the term, has become indistinguishable from action in general, and professional designers are increasingly engaging in the public realm, exploring new models of action to transform our relationship with governments, cities, organisations, technologies, and natural systems [26].*

Designers and planners are confronted with the critical responsibility of facilitating sustainable transitions through their practices, underscoring the essential integration of collaboration and sustainable development within the design process. They are not only tasked with facilitating the adoption of green practices and carbon-neutral production to restore equilibrium between the socioeconomic model and the ecosystem and its resources [27]. Additionally, they must prioritise inclusivity, participation, and epistemic pluralism to facilitate the circulation of knowledge, which is paramount for cultivating strategies aimed at addressing sustainable transition [28][29]. However, the current human-centered design paradigm is limited in handling these design critiques. It has proven to be effective in supporting (specific groups of) human needs and aspirations, providing more personalised solutions in the context of technological progress, mass consumption and economic growth. However, the commercialisation and use of human-centred design have revealed that it may not be well adapted to the challenges of complex socio-technical systems that straddle traditional silos, categories, and domains [8]. Together with a human-centred approach, there is a need to line structural complexity with a systemic approach, promoting local collaboration and broader engagement across society and non-humans, drawing on shared and diverse narratives to inform decision-making. It is necessary to develop

new collective points of view to create new mental interconnections, strategies, meanings and values that support this transition. In other words, the current scenario requires fostering the emergence of what is defined as ecological identity [30][31], which refers to:

> *a cultural identity and value system associated with a deeply internalised understanding of ecological connection, interdependence and embeddedness. This sensibility evokes ways of relating that are open, flexible, adaptable and self-aware. Ecological self challenges the boundaries of the reductive ego while situating itself in a network of dynamic relationships. Beyond notions of the isolated self as the basic unit of human experience and in contrast to the neoliberal subject (where social forces emphasise fragmented, competitive and narcissist tendencies) here each self is simultaneously singularly unique and part of the larger social and ecological orders and existing in relation to others [32].*

Several relational, multi-agency and post-anthropocentric design approaches have recently emerged, informed by post-humanist theories [8] such as *Actor-Network Theory* [33][34], *Feminist New Materialism* [35][36][37], *Object-Oriented Ontology* [38][39], *Non-representational Theory* [40], and *Transhumanism* [41]. These new design paradigms re-evaluate the human's position in a wide-ranging relationship with contemporary environments, adopting a design perspective that transcends human-centeredness. Among these approaches is the *More-than-human-centered Design*, which is one foundational pillar of the presented study drawing on the theory put forth by Professor Ron Wakkary in his book *Things We Could Design: For More Than Human-Centered Worlds* [42]. This approach acknowledges the multiplicity of intentionalities and situated pieces of knowledge within the design process, fostering deeper reflections on the designer's co-constitution with *things*. *Things*, as defined by Wakkary, are indeed non-humans made by humans and non-humans, which can be either concrete (i.e., what has already been designed) or conceptual (i.e., what could be designed). They encapsulate various abstractions, politics, and embodied particulars, and they are defined by three philosophical concepts which emphasise the co-evolution of humans and non-humans (*thing as Mediating Technologies*), highlight their relational nature and agentic capacities (*things as Assembly of Vital Matter)* and underscore their political and ethical dimensions (*things as Matters of Concern and Care*) [42].

Considering the shared agency and intentionality between humans and non-humans, designers emerge as amalgamation of human and non-human forces, accountable for their creations and their impacts on the interconnected, more-than-human world they inhabit. The notion that a designer is solely human has no more place and assimilating and embracing the interconnection with the non-human world becomes necessary for designers to effectively collaborate and design in the more-than-human-centered world we live in. Designers need to cultivate relational

perception and cognitive processes like attention and awareness. This can be accomplished by showcasing relationships, patterns, and dynamics within complex systems. It includes enhancing visual intelligence, fostering relational perceptual practices, developing the ability to perceive systems, and intentionally using imagination to improve perceptual flexibility [32][43]. Moreover, as emerged in the previous chapter, self-narratives are intrinsically linked to the development of cognitive processes such as perception and awareness. Consequently, they can also be viewed as tools that foster relational and ecological perception by interconnecting and situating individuals within their external reality. Narratives can highlight the interplay between human and non-human actors and their influence on the narrative experience, as well as challenge conventional notions of humanity by shifting narrative perspectives, as evidenced in the creation of non-human narratives [44][45].

As a result, narration and self-narration applied to the designers' self-identity creation can foster relational perceptual habits towards both the designed artefacts and the entities they are designed for and with, highlighting their complexity and mutual integration. While encouraging a sense of awareness and co-responsibility, they can also promote the creation of collective meanings and inclusive design practices by indirectly encouraging designers to think about the long-term impact of their inventions.

2.3 Professional Identity and Relational Perception in Design Education

Building one's professional identity as a designer entails balancing not only the development of agency and self-determination, which may help navigate life changes in the uncertain setting of the twenty-first century. But also the formation of a relational mindset capable of critically and successfully interacting with emerging social and environmental design concerns. This balance is particularly demanding for novice designers, who are concurrently developing their design skills. Design education indeed encompasses a wide range of programs, from strategic, theoretical, and technical studies to more artistic and practical approaches. Consequently, designers acquire diverse expertise, methods, and professional orientations that can “conflict with personal interests, potentially leading to an identity crisis in creative fields where professional and personal identities are typically intertwined” [46]. Although identity construction is a highly personal process, educational environments are responsible for providing students with the knowledge and tools to make the transition from school to work positively. Providing novice designers a space where identity exploration and expression can take place, fosters their professional identity and creates a diverse, rich, and fertile educational environment for the circulation and contamination of intentionality. Such an environment not only promotes the construction of students’ self-identity

but also encourages diversified and inclusive design practices, supporting the development of relational perception. Moreover:

> *making visible and explicit these different voices, intelligences and narratives that exist not only at the personal level but also in different faculties and programmes could benefit both designers and educators. Different voices, approaches, interests and practices in design education form the ground where the personal narratives gain their forms. Vice versa, personal narratives make these larger narratives and conceptions visible. To obtain a wider perspective on their own position in the design domain, students could examine their personal stories and strategies as a part of these collaboratively maintained narratives. Furthermore, analysing their own designs and their narratives would bring more dimensions to the awareness of their own professional identity [46].*

For their nature, constructivist learning paradigms and instructional design methodologies can provide substantial support. Since people build their knowledge through interaction with the environment and with other individuals [47] instructional design approach appears to be particularly insightful since activities implies fostering cognitive processes and creation of new meaning and conceptualization of realities [48][32]. Therefore, designing activities that aim to develop skills appears to be a valuable asset for fostering designer-identity-construction and relational perception.

2.4 Research gap and Research Proposition

While the literature cited has explored the relationship between self-narratives, identity construction and relational perception, as well as the relationship between design-based learning and the development of life-long competences, there is still a knowledge gap regarding how instructional design can effectively support the creation of designers' self-narratives that foster the development of relational perception with the more-than-human world. On these bases, the present study represents an initial exploration of this realm in the form of an instructional design project. Specifically, the research question that guides this study is "How can instructional design promote designers' self-narration through a more-than-human-centered perspective?". It aims to help students understand their professional identity and position in the design field, aiding their transition from school to work by creating a self-narration framework. This framework encourages reflection on personal stories, interests, skills, values, and aspirations, promoting a relational mindset that recognises the interconnectedness of humans and non-humans for inclusive and diversified design practices. The article will, therefore, be considered a contribution to presenting a design-based approach to investigating innovative learning ecosystems in the realm of self-identity construction and sustainable design. Through the development of an instructional project in the

situated context of Politecnico di Milano, it proposes a preliminary methodology for designers' self-narration through a more-than-human perspective. Moreover, it provides insights into developing a rich, diverse educational environment that is facilitative to professional identity construction, suggesting the potential extension of the methodology to larger sample and different design professions outside the world of design (i.e. engineering or architecture).

3 Methodology

3.1 *Research Through Design* and Qualitative Interpretation

The overall understanding of design learning, culture and education is rooted in a constructivist epistemology and interpretive paradigm, which became the basis for the research project. To explore new methodologies for designers' self-narration through a more-than-human-centered design perspective, the study has been grounded in a Research through Design (RtD) approach. This choice reflects the authors' background in design, which informed the methodological framework. By fostering deeper interaction between design practice and academic research through an iterative process of designing and reflecting on the design outcomes [49], RtD enables the generation of nuanced, context-specific knowledge essential for effectively addressing complex and multifaceted challenges. Despite differences in naming conventions and disciplinary nuances, RtD aligns with broader constructivist and pragmatic principles shared by established social sciences and education methodologies (e.g., Design-Based Research, Participatory Action Research, Grounded Theory). RtD has been selected for this research's scope as it is widely acknowledged in the design discipline, making it particularly suited to advancing both theoretical perspectives and practical applications in design education. Building on these assumptions, the initial phase of the study focused on desk research and the development of knowledge backgrounds. This led to the identification of the research gap and the formulation of the research question, which consequently led to the empirical application and the design of the instructional project and the assessment questionnaires. An interpretive paradigm was chosen to assess the proposed activity's effectiveness in meeting the intended learning objectives. By exploring participants' context-specific narratives of experiences, ideas, and opinions, this approach prioritized depth over generalizability and facilitated a comprehensive understanding of their engagement. It also provided valuable insights into how the activities influenced the construction of professional identity and the development of relational

perceptions, fostering a more comprehensive exploration of the participants' perspectives. The study assumed that qualitative research would help test and evaluate the activity planning, leading to the development of new perspectives, a methodological model, and preliminary teaching guidelines to support self-identity construction and sustainable design practices in design education.

3.2 Instructional project

Like the chicken and the egg: Which came first, the designer or the designed? [50] is the name of the instructional project developed to explore methodologies to foster novice designers' self-narration from a more-than-human-centered design perspective by examining the co-evolution of designer and designed (i.e., the design output). Its learning objective is to facilitate novice designers' accountability for their professional identity, emphasising the importance of personal context, experiences, and aspirations in their relationship with their projects and acknowledging the interconnections between human and non-human actors. For both the activities' design and subsequent assessment, the learning objective has been divided into two sub-objectives (Table 1), each with assigned indicators for assessment.

Table 1. Workshop: learning objective, sub-objectives.

Workshop's learning objective	Workshop's learning sub-objectives (participants will be able to…)
Enable the participants to emphasise the importance of personal context, experiences, and aspirations in their relationship with their projects, acknowledging the interconnections between the more-than-human world.	1. Emphasise the importance of personal context, experiences, and aspirations in their relationship with their projects
	2. Acknowledge the interconnections between the human and non-human world.

These indicators aim to evaluate participants' ability to 1) connect personal elements to their identity as a designer and design practices, 2) identify connections and relationships between these elements, and 3) present themselves by emphasising the elements, their interconnections, and reciprocity. In the study, personal elements are defined as aspects external to an individual but imbued with particular personal meaning. These elements encompass abstract and conceptual aspects, such as personal experiences, skills, interests, passions, and values, as well as physical and tangible aspects, including places, people, objects, and projects. The instructional project has been presented as a workshop, and it was tested in February 2023 on a sample of seven design students enrolled in the second year of

one of the master's degree programs at Politecnico di Milano School of Design. The call for participants has been distributed informally among students in the Integrated Product Design Master, Product Service System Design Master, Design and Engineering Master and Interaction Design Master. Following the constructivism theory of learning [51], the workshop was designed to be learner-centred rather than instructor-centred, promoting active engagement, cognitively challenging tasks, and peer discussion. At the beginning of the workshop, participants were split into small groups of 2/3 people. Their task was to examine the personal elements that define their design practices and professional identity and then create a self-narration to share with the other participants at the end. The process consisted of two activities of 35 minutes and one of 45 minutes, each including individual and group discussion work. In preparation, participants individually choose one of their projects that embodies their definition of themselves as designers. They all received four canvases, which were used to visualise the elements system (Figure 1).

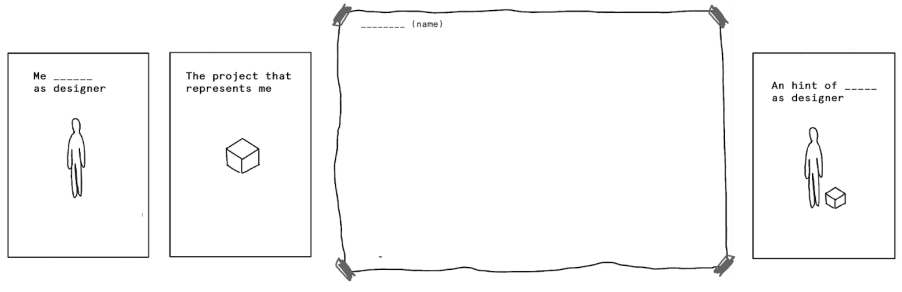

Fig. 1. Workshop canvases - from left to right: i) the participant as a designer, ii) the project that embodies the participant's self-definition as a designer, iii) the space where canvases i) and ii) are interconnected, and iv) the participant's narrative as a designer and their design practices.

The canvas corresponded to the following categories: i) the participant as a designer, ii) the project that embodies the participant's self-definition as a designer, iii) the space where canvases i) and ii) are interconnected, and iv) the participant's narrative as a designer and their design practices. The workshop activities and the supporting canvas are described in Table 2 and Figure 2. In the first activity, participants identify on canvas i) and ii) personal elements such as objects, sensations, contexts, or people that represent their definition as a designer and a project that embodies their designer self-definition. In the second activity, participants identified and named on canvas iii) relationships between each personal element through clusters and logical connections. In the third, final activity, participants use canvas iv) to create a self-narration by rearranging the elements selected and their relationship to enhance the meaning assigned to their design practices and designer identity. An example of these steps is shown in Figure 3. To

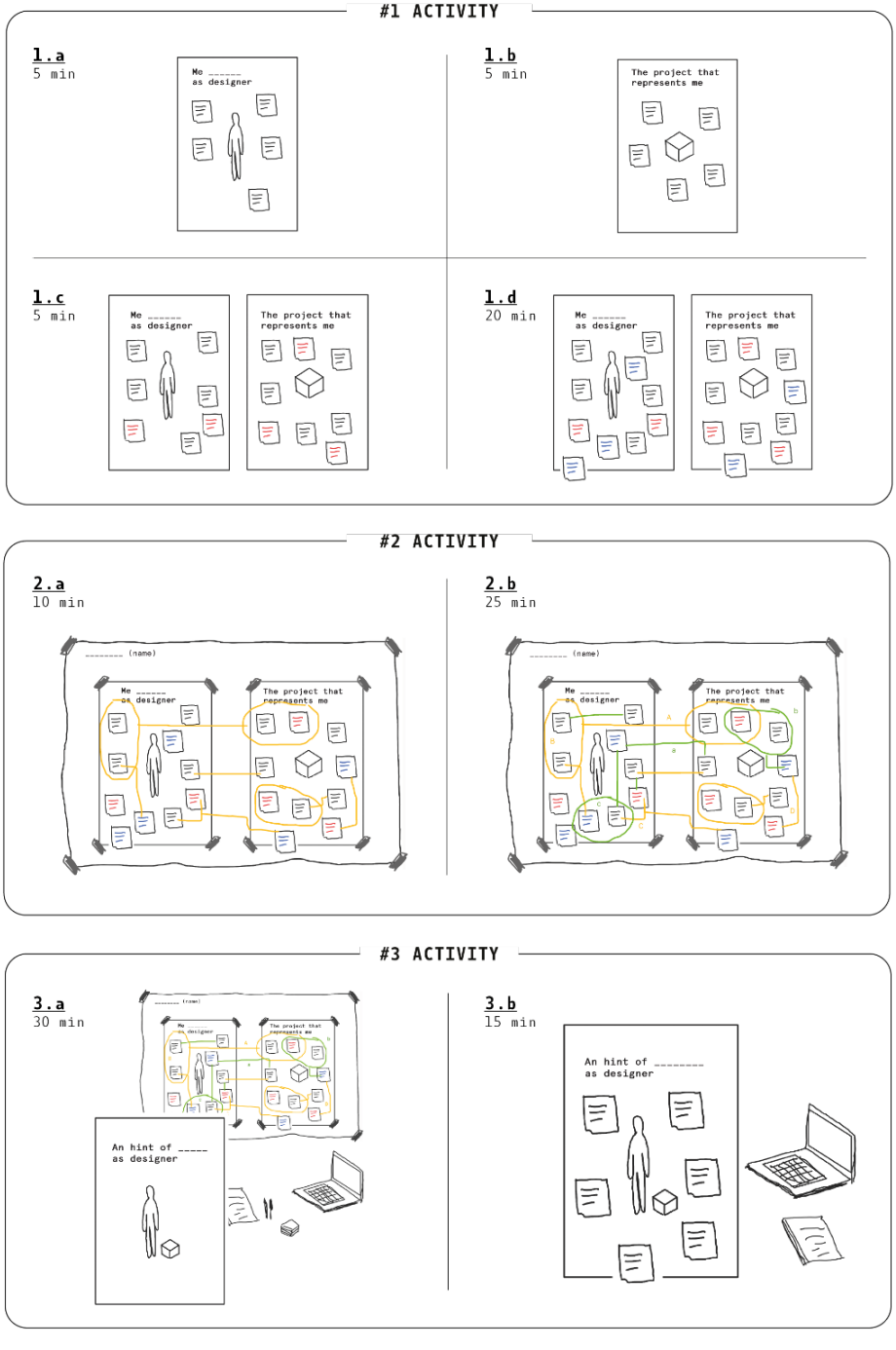

Fig. 2. Steps of the workshop: duration and canvases used.

help identify and visualise elements and their connections, participants were provided with stationery materials, including Post-its and coloured pens. Post-its allowed for the rapid generation and rearrangement of ideas, promoting agile movement and visual representation of relationships, patterns, and dynamics. Coloured pens were used to distinguish items added during each specific activity.

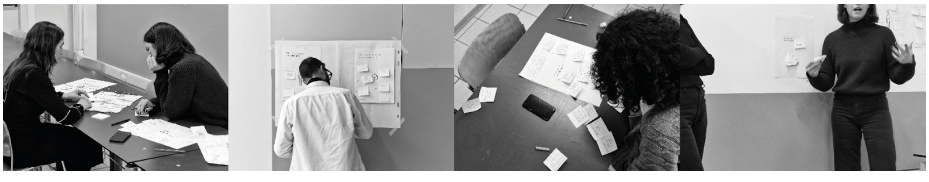

Fig. 3.. Steps of the workshop: identification of elements, identification of relationships, self-narration creation and final presentation.

Table 2. Description of each step of the workshop.

Activity	Activity description	Modality	Sub-objective
1)	**1.a | Find elements that describe you as a designer** Participants are asked to reflect on themselves as a designer and identify key elements that can help them describe their design identity. These elements can be abstract, such as skills (both hard and soft), personality traits, and interests, or they can be tangible, such as particular objects, places, and people that inspire them in their work. Participants are asked to write down at least five elements on post-its using a pen.	Individual work (15min)	1) Identify elements and actors that characterise their personal definition of designer and their design practices.
	1.b | Find elements that make your project meaningful Participants are asked to identify and write down at least five characteristics of their chosen project that give it meaning and significance. These characteristics can be abstract, such as the skills developed through the project or personal interests and passions related to the topic. They can also be tangible, such as the people involved in the project, the tools and resources used, or the specific context in which the project takes place. Participants are asked to write down at least five elements on post-its using a pen.		
	1.c | Look and add other elements if necessary If needed, participants can add additional elements to both their project characteristics and their self-description canvases by comparing and analysing them together.		
	1.d | Discuss your and your teammates' results The participants are divided into two groups: presenters and listeners. The presenters will share their sheet and visualised relationships with the listeners, who will ask questions and provide insights. If the presenter discovers new elements during the discussion, they will note them with a pen with different colours.	Group discussion (20min)	1)-2) Explain their own ideas as well as reframe them.

2)	**2.a | Find and name relationships between the elements** The participants analyse the two sheets they have created and look for connections between the characteristics they have identified and their chosen project. These connections can be based on personal meanings, visible patterns, shared interests or experiences, and tangible objects or contexts. To visualise these relationships, participants can move the elements around within their sheets using a linear or clustered arrangement. Each relationship should be labelled with a name, phrase, or explanation that describes the connection and what it reveals about the participant's design practices and identity.	Individual work (10min)	1) Identify and name relationships between them as a designer and their design practices.
	2.b | Discuss your and your teammates' results The participants are divided into two groups: presenters and listeners. The presenters will share their sheet and visualised relationships with the listeners, who will ask questions and provide insights. If the presenter edits or discovers new relationships, they will show and name them in a different colour.	Group discussion (25min)	1)-2) Explain their own ideas as well as reframe them.
3)	**3.a | Imagine to be in a more-than-human enterprise's job interview: create a story of you as designer based on the elements and relationships founded** Participants are asked to put themselves in the position of a job candidate for a "more-than-human enterprise" and use the insights gained from the previous exercises to create a 2-3 minute story that presents who they are as a designer. They should draw upon the characteristics and relationships they have identified to showcase their unique design identity and perspective. They can choose any medium they prefer, such as written text, images, drawings, or keywords, as long as their new teammates can understand the story without seeing the previous exercises. It is okay for participants to prioritise some elements over others and keep the story simple. The focus should be on communicating a clear and authentic representation of themselves as a designer.	Individual work (30min)	2) Creating a personal self-narration that include and valorise the elements and relationships founded.
	3.b | Pitch yourself to your teammates The participants share their narrative to the other participants, followed by feedback and discussion.	Group discussion (10min)	2) Present themselves.

3.3 Data collection and analysis strategy

Along with general information about the workshop, the call for participation included a link to an online questionnaire. The questionnaire was composed of six questions, which were proposed to participants before and after the workshop. The questionnaire focused on the perception and definition of the designer concerning the design practices. As will be explained in the next section, the data corpus collected through the questionnaires was used to analyse the participants' viewpoints before and after the workshop and evaluate the effectiveness of the activities. The assessment of learning objectives relied on qualitative analysis of pre- and post-workshop questionnaire responses and materials generated during the activities, complemented by overall experiential observations. The analysis focused on understanding the impact of workshop activities on participants' perceptions and experiences, irrespective of their backgrounds. Specifically, it aimed to ascertain if the activities facilitated new relational perspectives and self-enhancement, aligning with the learning goals outlined.

Questionnaire analysis. The questionnaires proposed were qualitatively analysed to make differences or similarities emerge in participants' viewpoints before and after the activities. Each participant's responses were evaluated based on specific Focuses of Analysis, which guided the assessment of changes or similarities in the way of defining and narrating the figure of the designer and design practices (Table 3). These Focuses of Analysis were derived from key themes identified in the literature and refined through discussions among the researchers to ensure consistency and relevance to the study's objectives. For each participant's answers, general observations were synthesised across three distinct levels: (1) general differences perceived in the overall questionnaires, specifically whether from the answers after the workshop there were changes in participants' perspectives; (2) differences in the conception of the designer, specifically whether personal elements (e.g., experiences, interests, values) were emphasised; and (3) differences in the conception of the designer-designed relationship, specifically whether the reciprocity between the designer and their design practices was recognised.

Table 3. Questions and related Focuses of Analysis used for the questionnaires' qualitative analysis, including guidelines for final observations summarising the overall participant's answers.

Questionnaire Questions	Focuses of Analysis
1) How would you define the figure of the designer? What are the main characteristics, skills, experiences etc... that make it so? Consequently, what does it mean in your opinion to design?	*Is the personal figure of the designer only defined by elements closely connected to the design process (such as stakeholders, users, concepts…)? Is the designer seen as a neutral observer/problem solver?*
2) What is the relation between the designer and the *designed* (design output)? Are they two separate things or are they connected? If yes, from what are they linked?	*Are relationships related to personal elements (experiences, skills, personality traits and aspirations..) mentioned?*
3) Beside the designer and the *designed* what is a project composed of? What are the elements/entities that shape it?	*Are the players listed large and diverse? Are entities that are not strictly connected to the design process considered?*
4) What is the relation between you and your projects? What are they telling about you and what are you telling about them?	*Is the project seen as a pure intellectual product, as an extension of the designer or as a mutual co-evolution? Is the project told in relation to one's own personal elements?*
5) From your point of view, which came first: the designer or the *designed*?	*Is the designer seen as the primary creator or as collaborator in the design process (co-evolved)?*

6) Why?	*For which reasons do they think so? Is this answer coherent with the previous answers? Does it question their beliefs?*
Final Observations	
Are there any differences in perspective before and after the workshop? If so, how strong are they? Does the participant show a different consideration of the figure of the designer? Does he/she show a different consideration of the relationship with the design output?	

Produced materials analysis. Produced materials consisted of the canvases of the first and second activities that the participants filled, as well as the canvas used for the final self-narration visualisation of the third activity. The materials produced by each participant, documented photographically, were evaluated quantitatively for the number of elements and relationships identified and qualitatively for the types of elements and relationships identified. Table 4 summarises the structure followed for the analysis.

Finally, the assessment of learning objectives was conducted by analysing the final observations of both the questionnaires and the materials produced by each participant, supported by the feedback received from participants in the questionnaires and during the workshop. Achievement was evaluated using a Likert scale, considering four levels based on the indicators related to each learning objective:

- Very much achieved: The participant did reach the indicator, adding more than the requested
- Achieved: The participant did reach the indicator
- Partially achieved: The participant did reach the indicator, but some aspects are missing
- Not achieved: The participant did not reach the indicator

Table 4. Produced materials' data processing including guidelines for final observations summarising the overall participant's results

Produced Materials Analysis	
Number of elements identified	n° ## of which n° ## emerged from activity 1.c of which n° ## emerged from activity 1.d
Number of relationship identified	n° ## of which n° ## emerged from activity 2.b
Total number of additions	n° ##

Type of elements and relationship identified	n° ## - creative tools (designer) n° ## - process oriented (designer, project and relationships) n° ## - personal skills (designer, project and relationships) …
Presence of personal elements and relationship in the final narrative	yes/no of which n° ## out of ## are related to personal elements
Final Observations	
How many elements and relationships have been found compared to the average of all participants? How many additions and changes has the participant made? How many of them have been made individually and how many emerged from group discussion? Are personal elements mentioned in the self-narration? If so, how do they emerge in comparison to project-related elements?	

4 Results

This section briefly presents the workshop's results and the five key findings that have been identified. During the workshop, all seven participants completed the activities by mapping personal elements and relationships on the provided canvases i), ii) and iii). Furthermore, they created a self-narrative of their designer identity, which was then presented as the final activity using canvas vi). The seven visualisations and self-narratives produced are shown in Figure 4. Along with the

Fig. 4.. The seven visualisations and self-narratives produced during the workshop from Participant 1 (up-left) to Participant 7 (bottom-right).

materials produced, participants answered the six questionnaire questions both before and after the workshop. The 84 responses collected —12 for participants— were qualitatively analysed, and observations for each participant were summarised in a final summary. An example of the final observations that emerged from this analysis is shown in Table 5.

Table 5. Example of a final summary of observations emerged from the analysis of one participant's questionnaires answers given before and after the workshop and the analysis material produced during the workshop

Final Observations | Participant 2
Questionnaire Answers: A significant difference is evident between the responses from the first and second questionnaires. The post-workshop questionnaire reveals a notable emphasis on the interconnectedness, reciprocity, and relationship between the designer and the *designed*, whereas the pre-workshop questionnaire highlights a more central role for the designer (particularly concerning question n°6 and 5). Both questionnaires demonstrate an awareness of contextual and experiential factors; however, the second questionnaire specifies personal elements more precisely, including the designer's past experiences, value system, cultural background, and skillset. Moreover, answer After Workshop - n°2 points towards a design vision as a collaborative process involving various entities (n.d. if human or non-human) aimed at improving the design outcome. **Material produced:** The number of elements and relationships is in the average of all participants (average: 23 for elements, 5 for relationships). Some additions or changes emerged from the group discussion, but fewer than those emerged individually. Both personal elements (personal skills, interests and values) and elements related to the project process are defined. In the self-narrative, more personal elements are present than project-related ones.

The summaries of observations derived from the examination of the seven produced materials and 14 questionnaires represent the main results of the workshop. These results formed the basis for assessing the workshop (Table 6) and for identifying the five key findings that follow.

Table 6. Workshop assessment: evaluation of learning objectives' achievement through indicators.

Workshop's learning sub-objectives (participants will be able to…) 1. Emphasise the importance of personal context, experiences, and aspirations in their relationship with their projects 2. Acknowledge the interconnections between the human and non-human world.	
Participants	Indicators (participants can…)

	1.1) Link personal elements to their self-definition as designers and their design practices	1.2) Identify the influences and relationships between the elements chosen	2.1) Present themselves giving emphasis to the elements chosen and their reciprocity and interdependency
Participant 1	Achieve	Achieve	Partially achieved
Participant 2	Achieve	Achieve	Very much achieved
Participant 3	Achieve	Very much achieve	Very much achieved
Participant 4	Achieve	Achieve	Achieved
Participant 5	Partially achieve	Achieve	Partially achieved
Participant 6	Achieve	Achieve	Achieved
Participant 7	Very much achieve	Very much achieve	Very much achieved

Improved emphasis on personal elements in self-narratives. The first finding indicates that most participants met the workshop's learning goals, emphasising personal elements in their self-definition and design practices. They identified and linked personal skills, traits, passions, and values, though less frequently mentioned experiences, emotions, places, and people. This resulted in diverse, unique narratives that highlighted each participant's professional interests, skills, and aspirations.

Limited recognition of reciprocity between the designer and the *designed* in self-narratives. Although most participants recognized the interconnection between human and non-human entities, the answers from the second questionnaire highlight that the majority still viewed the designer as the primary creator, indicating limited acknowledgement of humans-non-human reciprocity and co-evolution. Only two participants offered alternative responses to questions n°5 and 6 highlighting the complex web of influences and the fuzzy boundary between designer and *designed* and the complex web of influences, constraints, and feedback loops in which they interact.

Positive feedback on the proposed activities. Verbal feedback received during the and answers in the second questionnaire indicate that participants appreciated the activities and recognized the importance. They found personal reflection on their professional identity useful, and they valued group discussions for sharing and personal enrichment, especially with people from diverse backgrounds and disciplines.

I really enjoyed it; I found it was very well planned as a process as the activities built well on each other. I think it was important to do it with people you didn't know, and even better that they were from different disciplines. I honestly would recommend it to friends if you were to do it again as I thought it was very enriching, especially as we are in a moment of trying to understand who we want to be as a designer or at least what we would want to design [Participant 2, written feedback].

Different levels of familiarity with self-reflection. Table 8 also shows a varying degree of success among the participants; some (Participant 1 and 5) only partially met markers, while most (Participant 2, 3 and 7) exceeded expectations. Although there could be different reasons for this difference, this variance may stem from differing levels of familiarity with self-reflective approaches among participants, as indicated by written feedback and participatory observations as well as verbal feedback received at the end of the workshop:

This is the first time I've ever thought of this kind of thing; in fact, the last exercise was a bit challenging at first because I didn't know how to start and what to say [Participant 1, verbal feedback]

I often do these kinds of reflections, and I think they are very enriching. I'm used to think about myself as designer: for example, I had based my bachelor's thesis-portfolio on a visualisation of the relationship between me as a person-designer in relation to my projects [Participant 7, verbal feedback]

Limited previous experiences in self-narration as designer in an educational context. Most participants revealed that they had never engaged in such self-reflective activities on their identities as designers before, as shown by Participant 1 feedback and others:

Thank you for this gift because until now I have never defined myself as a designer, it's my first time [Participant 3, verbal feedback]

You know, I had never thought about these things. I mean, although I've present myself in many different contexts - and I'm not a person who has difficulties on talking - I've never thought about my identity as a designer [Participant 4, verbal feedback]

The fact that Participants 3 and 4 reached the learning objectives, despite it being their first time engaging in such activities, as well as Participant 4's ease with self-presentation indicates their propensity for self-reflection and communication, suggesting that self-reflection is influenced by past experiences, personalities, and interests. In our interpretation also the participants' academic background might be a factor influencing their propensity to self-reflection. For instance, Participant 5, who came from a technical background, was the participant who had the most

difficulty carrying out the activities and achieving the learning objectives. Indeed, the self-narrative created and the answers in the questionnaire received showed more emphasis on project-related elements than to personal elements.

I came from an engineering background to the design field. My motive to build something that makes sense is more important than making it work. However, I see I have some bias toward functionality, I am interested to design something according to a better experience [Participant 5, Answer Before Workshop - n°4]

I see that the designer is defined by the process of improving or enhancing the current situation by different means such as improving a product, creating an alternative narrative, and so on. I don't see design as a specific field as it is fitted in many fields that requires improvements [Participant 5, Answer After Workshop - n°1]

These aspects may suggest that professional self-awareness is not promoted and facilitated enough in the current didactic offer, as supported by the following feedback:

I don't know how many of us have done a bachelor here at Politecnico, but usually at the beginning of bachelor in the first courses professors give you several definitions of what a designer is; they give you like ten, twelve, thirty different definitions from famous designers that try to define design, and we never stop and give our own definition. So, we get to a point where everyone has to do it at the end of their master, trying to define what we are. But maybe it should be done before somehow. [Participant 6, verbal feedback]

5 Discussion

Results showed that the workshop's activities positively influenced designers' self-narration, emphasising personal context and acknowledging relationships with non-human entities. Four contributions to knowledge can be summarised from the five findings that emerged.

Instructional design projects focused on designers' self-narrative can encourage narratives that emphasise personal elements (e.g., passions, interests, experiences, skill) and relate designers to one's design practices, promoting a more-than-human-centered perspective. The participants in this study successfully achieved the proposed training objectives by completing all the activities proposed and reaching the learning objectives. These findings suggest that the instructional project proposed in this study was effective in promoting a more personalised approach to professional identity construction among designers. Specifically, the study found that the participants placed greater emphasis on

personal elements in defining their professional identity and their connection to design practices. Through the creation of unique narratives that highlighted individual interests, skills, and aspirations, participants were able to emphasise diverse professional profiles. In accordance with the paper's initial expectations, these results prove that designers can construct unique and compelling narratives that recognise the relationship between their personal elements and their design practices, as well as the human and non-human actors involved by promoting competencies-based learning processes in the realm of designers' identity construction. These processes promote a relational perspective that is helpful in increasing designers' awareness not only in their professional identity but also in the design process by developing a more-than-human-centred mentality that supports inclusive and sustainable design practices. Therefore, to promote a personalised approach to professional identity construction through a more-than-human-centred approach, practical insights can be outlined: the following practical insights are recommended: using flexible work environments and materials for agile generation and modification of elements; employing visual representations of relationships and patterns; organising workshops in blocks to manage increasing difficulty; alternating individual reflection with group discussions; utilising guiding elements like brainstorming questions and props; and proposing hypothetical scenarios for contextualising and creating personal narratives.

Lack of experience and familiarity with self-reflection practices, along with different backgrounds and personal experiences, might limit the designer's professional identity construction. While the learning objectives of the instructional project have been achieved, a noteworthy finding is that participants demonstrated varying degrees of proficiency in achieving the proposed indicators. According to feedback received from participants, the ease or difficulty in carrying out the proposed activities was influenced by their familiarity and previous experience with self-reflection approaches, which in turn affected the final execution of the activities. Additionally, factors such as past experiences, individual personalities and interests, and academic background may influence one's inclination towards self-reflection. For instance, participants with technical backgrounds and design methods (e.g., design engineering) tended to have a more limited vision of the designer as a problem-solver and experience improver/enhancer, resulting in a narrower definition of elements in terms of quantity, typology, and variety, which in turn influenced the creation of their narratives. Conversely, participants who reported personal and extra-curricular experiences, as well as a personal propensity for communication and reflection, identified a more significant number of elements and created rich and elaborated narratives.

The limited experience or the difficulty in dealing with self-reflection and relationship activities may depend on a didactic offer that does not facilitate this practice. Although various factors and individual traits may have influenced the limitations and differences observed in the participants' self-narration and relational abilities, the feedback received from participants suggests that learning environments also play a critical role in developing reflection skills and constructing identity. The feedback indicates that the lack of similar activities in training courses and the reliance on strictly methodological and transmissive teaching approaches can hinder the development of these skills. This aspect leads to two significant considerations. Firstly, educational environments should foster students' personal growth to enable them to build their professional identity foundations and ease their transition from school to work [25][7]. Although designers must limit their biases in the design process in order to create solutions that meet the needs of the users involved, they should likewise maintain their personal perspectives, as alienation from these can disrupt the individual's knowledge-construction process rooted in past experiences and knowledge [46]. Such alienation can limit the construction of one's professional identity, thereby hindering students' ability to independently recognise and nurture their potential and uniqueness, which is essential in navigating the 21st-century world of work. Secondly, educational environments should promote students' internalisation of multi-intentionality and shared agency with non-human actors, as collaboration between humans and non-humans is nowadays becoming increasingly prevalent and ubiquitous. The rapid progress of Artificial Intelligence is one of the most relevant examples showing the growing multi-intentionality and shared action with non-human actors. Although this promises multifaceted benefits, strengthening critical design capacity is crucial to address complex contemporary wicked problems, for which a deep understanding of the complex and unique network of factors and actors that characterise them is necessary. The fact that most participants still regarded the designer as the primary creator may suggest that the deep interconnection with non-human actors has yet to be fully internalised among students. The responsibility of learning environments is to provide the opportunity to foster the development of a more-than-human-centred mentality that locates the designer within a network of dynamic relationships between entities that co-evolve through multi-intentionality and shared agency.

Students feel the need to reflect on their own professional identity. Despite challenges faced by some participants due to limited experience with self-reflection approaches, the activities were positively received and deemed beneficial for future professional careers. Feedback highlighted enjoyment of the workshop, expressed interest in its repetition, and emphasised the importance of reflecting on one's identity as a designer for understanding their positioning and aspirations. These

aspects are relevant given that recent graduates and novice workers are required to develop a strategic mindset and establish life goals to identify opportunities and resources in the 21st-century world of work [13][52]. They need to know what is essential to them to make choices based on their goals, which also contributes to psychological well-being and personal fulfilment. However, the uncertain context of the contemporary world can challenge the stability and mental balance of individuals, which can explain, for example, the gradual increase in requests for psychological assistance within the university environment [53][54]. The workshop proved to be a valuable and easy-to-implement instructional activity that can promote such reflections.

Implications of the contribution on Smart Learning Ecosystem beyond 2030. The findings of this study and their discussion underscore the importance of adopting reflective and relational learning approaches in design education, stressing the need for the development of more holistic, inclusive, and sustainable learning ecosystems. In contrast to traditional transmissive educational methods, this approach facilitates the development of competencies that critically recognise interconnectedness beyond human agency by encouraging designers to construct their professional identities through personal narratives rooted in relational and self-awareness. This viewpoint, which is consistent with core concepts in contemporary educational discussion, such the *Troyes Declaration (Timisoara 2.0)* [10], enable and encourage designers to actively and responsibly interact with and within the world they live in. It facilitates not only the transition toward post-anthropocentric educational models that prioritize interconnected ecosystems and, consequently, the responsible use of technological and natural resources. Additionally, it also promotes educational environments and processes that value students' well-being rather than merely their isolated performance. Therefore, in promoting a more-than-human-centred perspective to designers' professional identity construction, this contribution calls for rethinking design learning environments as adaptive and generative spaces where students can intertwine with their surroundings, grow and collectively flourish while interacting with the socio-environmental challenges of our rapidly changing world, both in their design practices and transitioning from school to work.

6 Conclusion

In advancing the disclosure on Smart Learning Ecosystems beyond 2030, the article contributes to the growing body of literature on design education, self-identity construction and sustainable design practices by presenting an exploratory study of methodologies for designers' self-narration through a more-than-human

perspective. It explores and highlights theoretical connections within these fields to generate new perspectives supporting inclusive, holistic, and sustainable approaches to professional and design educational development.

A *Research through Design* approach was used to develop and test an instructional project within the situated context of Politecnico di Milano. The findings emerged from the data analysis and interpretation brought out a general positive effectiveness of the activities in facilitating designers' self-narration, emphasising the importance of personal context, experiences, and aspirations in their relationship with their projects, acknowledging the interconnections between the more-than-human world. Varying levels of self-reflection proficiency were observed, influenced by factors such as experience with self-reflection practices and academic background. At the same time, participants' positive feedback highlighted the workshop's value in facilitating reflection on professional identity and its potential for enhancing participants' understanding of their positioning and aspirations. These aspects highlight the crucial role of educational environments in fostering self-reflection and competence-building, providing fertile ground for collaboration and identity construction.

In conclusion, this study should be understood as a pilot project to explore the intersection of three areas of inquiry through a more-than-human perspective, i.e., design education, self-identity construction and sustainable design practices. Given the pragmatic nature of design research and practice, the assumptions emerging from the literature review have been assessed by developing an instructional design activity within a situated setting. As a result, the findings should be considered a foundational starting point for further exploration. The limited number of participants was a deliberate choice to prioritize depth over breadth, aligning with the research focus and scope while ensuring the analysis remained manageable within the available resources and timeframe. However, we acknowledge that this limitation affects the generalizability of the results. Future research could build on these insights by employing a larger participant sample, ideally comprising students from different years of study to provide a more comprehensive dataset and enable more in-depth evaluation on long-term impact. Moreover, to enhance scalability and accessibility, the activities could be adapted for collaborative digital whiteboarding platforms and extended to other disciplines that involve design practices, such as architecture and engineering. Finally, to develop a more embedded and articulated more-than-human-centered mindset, self-narration activities could be introduced with a decentralization of the designer, such as more-than-human narration or co-creation of narratives. This approach would facilitate a more direct recognition of interconnections, multi-intentionality, and shared agency between humans and non-humans.

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