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Publisher

Aiap Edizioni
via A. Ponchielli 3 – 20129 Milano – Italy
aiap@aiap.it – www.aiap.it

PAD © ISSN 1972-7887
#24, Vol. 16, June 2023
www.padjournal.net

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DIGITAL ARCHIVES

**NEW MATERIALITY
AND INTANGIBLE HERITAGE**

Learn Through Memories

A Didactic Way to Learn and Teach with the Use of a Digital Knitwear Archive

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Keywords

Knit Design, Digitalization, Digital Archives, Material Heritage, Learning Resource.

Abstract

Born with a very artisanal and manual connotation, knitwear design has evolved into a highly technological industrial practice supported by digital tools and advanced machinery. For this reason, teaching in the field is a constant challenge requiring innovation and updated information, together with a memory of the more traditional aspects. The article reports a research work born at Politecnico di Milano upon the acquisition of the material archive of knitted samples donated to the School of Design by Marina Spadafora, a designer with a long-standing career in the knitwear field. Given the archive as a rich physical resource, collected and classified by the knitwear professional along her creative career as a daily-basis working tool, academic researchers questioned how they could extend its purpose to bring innovation to teaching and learning methods, combining the physical and the digital dimension. The research investigated the needs of knit design students, researchers, and professional designers to identify the advantages and the barriers in consulting the archive and connected the more theoretical notions about knit structures and the increasingly digital practices with the material heritage of the archive to result in a resource that stimulates students' creativity and increases the learning experience.

1. Introduction: From Hand Knitting to the Contemporary Knitwear Industry

Knitwear is one of the most ancient handwork practiced by humans to make clothes and accessories. With time, utility evolved into a hobby, and in the last century, the hobby has experienced the transition into project and the transposition of a purely manual process into a discipline that brings together craftsmanship, design, and technological evolution (Annichiarico, 2009). Nowadays, knitwear design is a highly technological industrial practice supported by digital tools and advanced machinery. For this reason, teaching in the field is a constant challenge requiring innovation and updated information, together with a memory of the more traditional aspects.

The contemporary process of designing, and thus of teaching and learning knitwear is two-fold: on the one hand, the complexity and variety of the techniques. On the other, the infinite creative possibilities it allows. In this dualism, the technical notions become, for designers, the solid knowledge that is the foundation of free and creative design.

At Politecnico di Milano, the research group in Knitwear Design has been working on tools and methods to structure a path for knowledge transfer and the generation of updated skills for designers in the field.

The literature reports diverse teaching methods and approaches, some more focused on creativity and some more related to the industry and the production chain. Often the various approaches are related to the presence or absence of an industrial territory around fashion schools. As reported by McRobbie (1998), British art schools include knitwear as a

purely creative art refusing the more commercial aspects of fashion that could negatively affect the aspiration and quality of one's work, while Volontè (2010; 2012) compare the British approach with the Italian one, stating the latter as more oriented towards the diversity of positions within a fashion system and towards the industrial side of the product. This is also the approach taken at Politecnico di Milano, where Knitwear Design is rooted among the disciplines of Industrial Design and therefore is taught to students by combining theoretical knowledge with creative exercises and practical implementation. The discipline combines theoretical and technical knowledge with the material and manual creation of real test swatches and projects realized through hands-on experimentations on manual knitting machines and through the practice of software programming for electronic machines. Working with the technicians in the laboratory, students learn how to master the almost infinite possibilities of this production technology, and they understand theoretically and practically the functioning and peculiarity of knitwear: the yarns, the fits, the elasticity of the fabric, etc. (Affinito et al., 2017).

Given the evolution of technologies, both concerning machinery and digital tools, teaching knitwear design requires, together with a present memory of the more traditional aspects, innovation and updated information. The article reports a research work born at Politecnico di Milano upon the acquisition of the material archive of knitted samples donated to the School of Design by Marina Spadafora, a designer with a long-standing career in the knitwear field. The archive is a rich physical resource collected and classified by the designer

along with her creative career as a daily-basis working tool. With the donation, the archive changed its location and amplified its potential public, adding new typologies of users and gaining unprecedented functions.

Today (Wright, 2002), students, researchers, information professionals, and the general public can directly access many of the world's rarest artifacts right at the desktop or other web-enabled device, at any time and from any location. Academic researchers questioned how they could combine the physical dimension of Archivio Spadafora with digital tools to extend its purpose and innovate teaching and learning methods.

Could digital tools improve and expand the consultation of the archive, making it not just easily accessible and readable but also an augmented source of information to learn from? How would the archive have been able to transmit to students the ability to observe, get new knowledge and be creatively inspired? How to make it as contemporary as possible, in step with technological evolution?

To answer these questions, researchers carried out a field research, trying to understand the needs of the students and how to help them, increasing the teaching method in progress.

2. Methodology

The research has been structured with a preliminary phase on three parallel tracks:

- First, analysis of best practices in using archives, with a literature review and case studies on fashion archives related to the macro-themes of education and digitalization.

- Second, given the technical complexity and uniqueness of knitwear, the identification of parameters to define the coordinates for an updated organization of the archive content. This investigation has been made by comparing the specialized literature with the direct technical expertise of the authors in the field, considering technical notions and how this specific knowledge is transferred to students-designers.
- Third, understanding of the Spadafora archive's current state, its structure, and its users.

The preliminary research has been followed by a qualitative investigation made with open interviews with current and potential users to analyze limits and problems in the existing and open space to meet the emerged needs. The interviews were made to knit design students, researchers, and designers to identify the advantages and the barriers in consulting the archive. In addition, a quantitative survey was carried out to understand the importance of digital tools in the current evolution of the teaching and learning processes. The collected information has been the starting point for developing updated solutions and the project's future direction, resulting in a pilot of 10 technical sheets to be tested and implemented throughout the archive.

3. Preliminary Research

3.1. The Use of Digital Archives as Teaching and Learning Resources: Possible Perspectives

Archives were created as a management tool to meet the contingent needs of producing and storing entities, institutions, and people documents. With time, archival documentation

(Centro Studi Assolombarda, 2002) added to the exquisitely practical use as a management tool the cultural use as a trace for the reconstruction of the past, where every single document is part of a mosaic and inserted in a network of relationships determined by needs (Masciariello, 2020). Also, the records of an archive changed status over time: they passed from a character of the current use (needed for a here and now) to their freezing in a dimension of historical testimony (Masciariello, 2020). The archive is, for this reason, something not currently in the present, but it becomes in the moment is used for contemporary reasons. This is a very common practice in fashion: the idea to redesign, re-evaluate something old and transform it under a modern way of seeing makes the archives a fundamental resource for professionals, as a source of creative inspiration or a more technical reference. But professionals are not the only audience possible. Consulting an archive can assume various purposes for diverse users – students, institutions, researchers, teachers, wider public – and all of them can get “the chance to get to know the daily going-on of Italian knitwear, hidden away from the extravagantly staged fashion shows at each change of season” (Motta, 2018). However, to be triggered, this process needs specific conditions: the archive cannot be a random accumulation of documents; these documents must be in a relationship, arranged according to a particular order (Feyles, 2013), and obviously accessible. In the last two decades, the evolution of digital technologies favored their application to the archives. Many of them, either corporate or public, have been made digital to facilitate consultation, expand the reachable public, and improve the classification and organization of documents.

By its nature (Centro Studi Assolombarda, 2002), digital collection development requires extensive use of technological resources. If in the early days of digital libraries' development, collections were typically small and experimental, today's technologies allow us to put substantial collections online, and the dimension and complexity of archives are not a limit anymore. Digital archives have become quite diffused also in the textile and fashion field. The present study identified some relevant cases, here briefly resumed in Figure 1, and investigated their accessibility and potential use in education.

NAME	WEBSITE LINK	LOCATION	TPOLOGY	CONTENT	DIGITALIZATION	DIGITAL LOCATION	ACCESSIBILITY	OPEN TO STUDENTS
TEXMEDIN	TEXMEDIN	ONLINE	DIGITAL	T F K	COMPLETE	WEBSITE	EVERYONE	YES
TEXTILE LIBRARY	TEXTILE LIBRARY	PRATO	PHYSICAL + DIGITAL	T F K	PARTIAL	OPAC	EVERYONE prior authorization	YES
EUROPEANA	EUROPEANA	ONLINE	DIGITAL	T F K P	COMPLETE	WEBSITE	EVERYONE	YES
RATTI	ARCHIVIO RATTI	GUANZATE (CO)	PHYSICAL	T P	NOT PLANNED	NOT PLANNED	EVERYONE	YES
MANTERO	ARCHIVIO MANTERO	GRANDATE (CO)	PHYSICAL	T P	NOT PLANNED	NOT PLANNED	just internal	NO
LINEAPIÙ	ARCHIVIO STORICO LINEAPIÙ	CAMPI BISENZIO (FI)	PHYSICAL + DIGITAL	K Y	PARTIAL	ONSITE DEVICES	Fashion operators	YES
A.N.G.E.L.O.	ARCHIVIO A.N.G.E.L.O.	LUGO (RA)	PHYSICAL + DIGITAL	F	PARTIAL	WEBSITE	Fashion operators prior authorization	YES
MEI	ARCHIVIO MEI	VALEGGIO S/M (VR)	PHYSICAL + DIGITAL	T F K	PARTIAL	ONLINE PLATFORM	Fashion operators prior authorization	YES
ARMANI	ARCHIVIO ARMANI SILOS	MILANO	DIGITAL	F P R A	COMPLETE	ONSITE DEVICES	EVERYONE prior authorization	YES
FERRÉ	ARCHIVIO FERRÉ	MILANO	DIGITAL	F P R A	COMPLETE	WEBSITE	EVERYONE	YES
MANTECO	ARCHIVIO MANTECO	MONTEMURLO (PO)	PHYSICAL	T K	NOT PLANNED	NOT PLANNED	Fashion operators prior authorization	YES
CENTRO RETE BIELLESE ARCHIVI TESSILE MODA	ARCHIVIO BIELLESE	PROVINCIA DI BIELLA	DIGITAL	T F K	COMPLETE	WEBSITE	EVERYONE	YES
FONDAZIONE FASHION RESEARCH	ARCHIVIO FER	BOLOGNA	PHYSICAL + DIGITAL	F P R A	PARTIAL	WEBSITE	EVERYONE	YES
FONDAZIONE FERRAGAMO	ARCHIVIO FERRAGAMO	FIRENZE	PHYSICAL + DIGITAL	F A	PARTIAL	SOFTWARE SAMIRA	Fashion operators	YES
ARCHIVIO MISSONI	ARCHIVIO MISSONI	ALBUSCIAGO (VA)	PHYSICAL + DIGITAL	T F K R A	PARTIAL	WEBSITE	Fashion operators prior authorization	YES (theses support)

Figure 1. Case studies of fashion and textile archives. Content legend: T=textile, F=fashion, K=knitwear, P=prints, Y=yarns, R=runway, A=ads, authors, 2022.

The several case studies analyzed showed that archives are used above all by designers inside companies or by specialists in the sector. Seven archives out of 15 are accessible just by fashion operators, 14 out of 15 are open to students, but six require authorization, which students perceive as a barrier.

Despite being digital, physical, or both, most cases appear organized for professionals rather than for educational purposes. 19 out of the 12 digital archives (except for Europeana, Archivio Ferrè, and Archivio MF1) present digitized pictures of the physical but very poor or total absence of additional information: this means that students can't rely on tools to orient themselves during a consultation and the archive does not acquire educational features. To Innocenti (2006), corporate documentation centers are added value centers that cannot limit themselves to offering services but should proactively meet users' needs, changing their role as information distributors to knowledge partners who define a link between external and internal information. According to Conti, Motta, and Rech (2020), an archive can be a learning resource to expand the knowledge and mentalities of the students, applying what they learn theoretically by touching finished products that could be usually seen only in books and at the same time to be active in replicating, re-studying, redesigning the old elements according to their creative vision. It recalls the words of Innocenti (2006) again when she declares that in a document organization system, the most important feature of information is that it can be used out of context, creating networks of relationships and contexts and, thus, new knowledge. This has been the purpose of the present research for Archivio Spadafora.

3.2. Finding Classification Parameters for Complex Knit Structures

Given the immense variety of knitted structures that can be obtained by changing one or more of the elements –i.e., yarn, stitch size, machine gauge, color, material– that constitute a

knitted fabric, the work of researchers in this phase identified guidelines for the archive organization,

The owned technical expertise and previous research on knit design teaching allowed the authors to identify the 4 knit-wear structures that are the basis of any possible evolution or variation of a knit fabric (Single jersey, Ribs, Double jersey, Tubular knit) and 8 basic stitches. From these 12 elements, combining structures and stitches, designers can generate all the possible existing knitted fabrics.

This means that stitches in the archive can be easily and effectively classified with these two parameters that concern both the aesthetic aspect of the fabric and the technical construction and realization of the structure.

3.3. Current Analysis of Archivio Spadafora

The archive is located inside the Politecnico di Milano material library based in Milan Bovisa Campus and is accessible during the library's opening hours. It comprises 5000 knit stitches stored in folders and is currently divided into 22 categories based on how Marina Spadafora delivered it. The categories refer to the type of stitch or technique used (e.g., ribs, hand stitches, braids) but also to the function (e.g., edges and collars) or other general features (e.g., stretch, light textures). Each category includes a variable number of samples with no additional material, structure, or application information. All the samples have been scanned and digitally uploaded on the website of the university archival system of the Politecnico di Milano (<https://www.biblio.polimi.it/>) as part of the university library and material library called Materioteca. The digital version of the archive so far reports the front and back scans

of each sample and is divided according to the categories of the physical archive. Although a good starting point, the archive still needed intervention to become a useful educational resource.

4. Qualitative Interviews and Quantitative Surveys

To understand the current situation and propose solutions to innovate and improve the use of the archive, qualitative interviews were carried out during the academic year 2021/2022 with two designers and teaching assistants (Beatrice Zagatto and Enola Cappellari) and three students of the same course (Pietro Lo Presti, Alberto Melli and Michele Fumagalli). All five interviewees have been using the archive for design and learning purposes.

Here reported are the most relevant extracts from the interviews:

“I used it for design projects, particularly in the initial phase to find inspiration.” (BZ)

“It must be more connected to the courses and the knitting lab.” (EC)

“I would love more explanations on the knitting stitch that I observe, even if only a general indication, a nomenclature.” (BZ)

Both found the archive division clear and effective but still incomplete. They underlined the need to make this archive even more a valuable tool within the university. Both welcome a possible digital version, underlining the importance of having a source to consult quickly, anywhere and at any time.

The first impression on knitwear was very positive, I immediately liked the blend between technique and creativity, but I find that a great degree of technical competence is needed. [...] the level of creativity stops only where the technique ends, whether it is the worker's competence or the limits imposed by the machine. (PLP)

Pietro's words clarified how creativity in knitwear is always accompanied by great theoretical and practical knowledge. Speaking directly of the archive, the three students agree that it is very useful, especially in the project's initial phase, to find inspiration and get even more in contact with knitwear through knit stitches. The students found the division of the archive functional and comprehensive but not sufficient, especially if approached with no guidance or indication:

I think it can still be useful even in the intermediate/advanced phases in this case, however, it is easier to search on the internet because it is possible to find a more detailed explanation with diagrams and how to make a given sheet which is often (rightly) missing. (AM)

A problem is certainly the search filter limited to relevance, title, author and year. To accompany each swatch there are still keywords that can be used to further filter the search as, for example, lines, hand, braids, texture, openwork, etc., but in my opinion, you could make the search even easier by adding these keywords directly in the filter panel. [...] The categories are clear, but the problem is the ability to understand what I observe. I found very interesting things in all categories, especially in heavy textures. The main gap is between theoretical and practical notions. (MF)

The reported words prove that the archive is used and appreciated by students, but limits and gaps prevent it from being effectively usable to the maximum. In particular, what was encountered by the students was the inability to find a scheme and a guide capable of identifying and helping in the observation of the swatches within the archive.

The quantitative surveys got 42 responses from students who attend or attended the knitwear design specialization course at the School of Design at Politecnico di Milano. The results showed that students favor a digital version of the archive, but they consider it as a way to anticipate and expand the access in-presence to the physical samples and the additional information provided.

The pandemic, indeed, forced design teachers and learners to work remotely on physical artifacts, exploiting digital tools and equipment in innovative ways. Today, with a slow but progressive return to physical and in-presence, the digital solutions found during difficult times are not anymore “replacing” the physical ones but are opening opportunities. Digital environments are becoming a support in the rapid change of approach we are experiencing: after a decade of Industry 4.0, we are now approaching Industry 5.0, which focuses on a symbiosis between humans and machines (Longo, Padovano, Umbrello, 2020; Xu et al., 2021). The surveys report how difficult it was to follow design classes at a distance but also demonstrate the will to pursue a hybrid form that grasps both physical and digital realities’ strengths. Emerged clearly the need for digital material to freely consult without the restrictions of university hours to optimize project timing.

Distance learning and digital platforms are still perceived as poor by the majority of students but are recognized as a starting point to create innovative and highly functional teaching of the future (Fig. 2). By working on the updating of the archive, a way should be found to organize it in the best way possible for educational purposes, without ignoring the opportunity given by the digitization of tools, as the archive can potentially be a primary example.

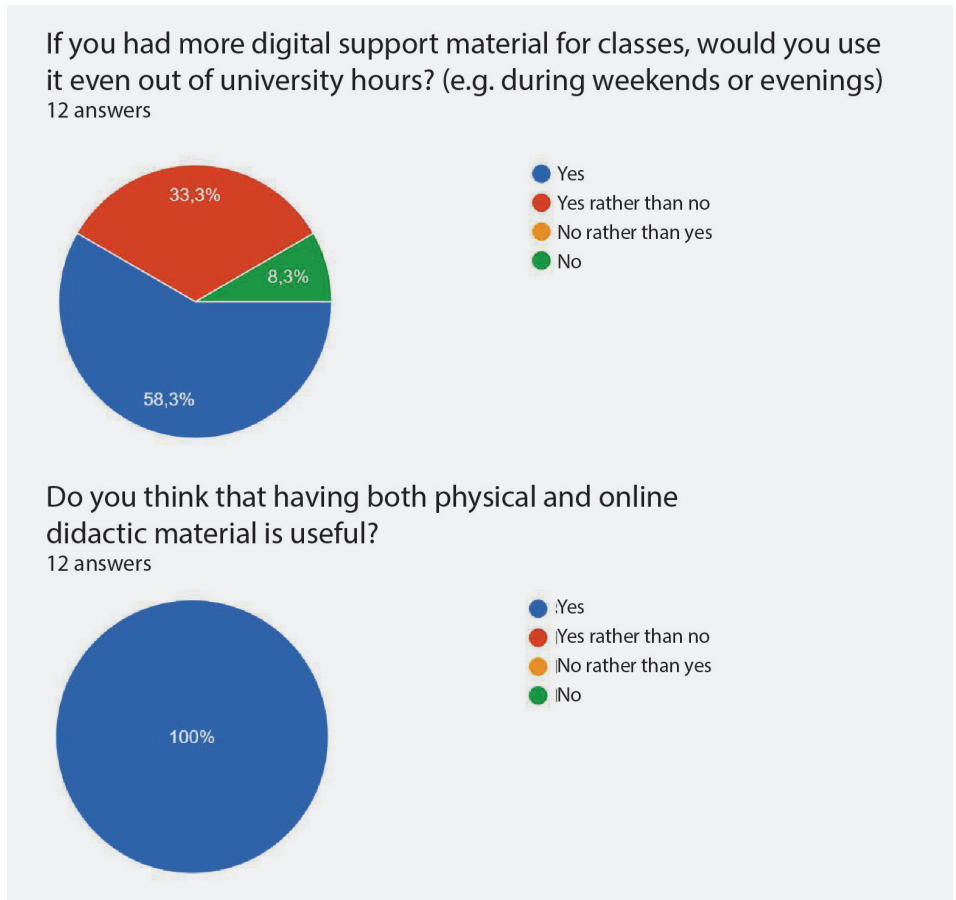


Figure 2. Quantitative evidence from the survey, authors, 2022.

5. Results and Discussion

From these findings, the authors designed solutions for the archive to make it a tool to support knowledge transfer for future knitwear designers, able to adapt to rapidly changing contexts, both in the teaching-in-presence and in more autonomous learning moments.

The design process followed 3 consequent steps and multiple reiterative cycles of verification of each step.

Step 1: Codes for Clarity in Consultation

Step 1 was based on the previously formulated guidelines and consisted of designing an effective system to represent knitting structures and their variable parameters. The system consists of color codes and symbols and is correlated by an introductory guide to make the consultation easy and facilitate the workflow.

Each stitch is represented by a symbol and a color (Fig. 3) that resemble the code used by the Shima Seiki SDS Apex3 software for industrial knitting machines that students are familiar with.¹ Despite the associated color, the symbols are universal among knitwear professionals and thus recognizable by people familiar with machine knitting, regardless of their familiarity with Apex3 software.

1 This system of codes has been used in the professional environments since the 80s, when the first computer-controlled knitting machines were released by Shima Seiki. Even with the updates of technologies, the basic symbols remain the same. As Shima Seiki is one of the two main players for power knitting machines together with Stoll, this language is one of the two globally diffused and recognized among professionals.



Figure 3. The 8 basic stitches with colors and symbols, extract from the introductory guide for consultation, authors, 2022.

Step 2: The User Journey for Digital and Physical Access

The second step concerned the design of the user journey, based on the user and the fruition typology, with particular attention to the physical dimension counterposed to the digital one. The support material has been organized as a digital platform that contains and expands the knowledge about the physical catalogue. Users can consult the archive entirely virtually or visit the Materioteca and access the digital contents by scanning the QR code next to each knit swatch.

Step 3: Knowledge Implementation

The third step regarded the additional information to implement the knowledge related to each sample. The research work focused here on the definition of the content structure, on the selection of useful specific information, and on its organization that could address both educational purposes and support professional research.

The additional knowledge has multiple aims:

- to give a guide and explanation of the knit stitches that can be found in the archive;

- to demonstrate the different applications and variations;
- to spark creativity that can take the existing and expand future solutions by showing the different changes that can be made starting from the same structure, stitch or material.

Based on these premises and the researchers' technical expertise in knitting, the research led to the first set of 10 pilot technical sheets (Fig. 4) to be tested during A.Y. 2022-2023. After the test and the possible modifications, the sheets will be progressively implemented throughout the archive.



Figure 4. One of the 10 pilot technical sheets that contain: references to the consultation guidelines; color codes and symbols to identify the main features of the sample; detailed information on how the sample is made and could be replicated; possible variations with reference pictures that show what could happen when changing yarns, tension, machine gauge, pattern. Authors, 2022.

The 10 pilot sheets gave a solid basic structure to the additional contents. The future work will progressively create new sheets, following several directions suggested by the field analysis and the literature, to exploit the digital as a tool to extend the physical and create new knowledge.

Future actions envisioned, both on the research side and the educational one, are:

- implementation of the platform with the chance to create personal lists to save favorites or samples you consider more interesting and inspirational;
- implementation of the relations and links between the sheets to enrich the consultation experience;
- study of the possible implementation of sheets with video tutorials;
- analysis of the technological evolution and updates of the digital resource;
- experimentation of new ways of using the archive for teaching, not just leaving students consulting it on their own but including class hours spent with the archive (both physical and digital) in different moments of the learning process, using its multiple levels of knowledge with new-learners and more expert students.

6. Conclusions. The Future of the Project

The research results show how digital tools and environments can improve and expand the consultation of a physical resource giving easy access to augmented knowledge. Making the archive not just a catalogue but an evolving resource

that responds flexibly to different users' needs is possible. The research connected the more theoretical notions about knit structures and the increasingly digital practices with the material heritage of the archive to result in a resource that stimulates students' creativity and increases the learning experience. Whatever the level of experience of the ones approaching the archive, from earlier learners to expert professionals, resources are now organized for optimized workflows, and additional contents are designed not to give notions but to open perspectives and suggest experiments with technical and creative solutions.

The choice of making it digital makes the future of these research results much broader and expanding. The digital connotation makes it easy to continue creating additional knowledge by generating new technical sheets, updating old ones, and connecting them with each other.

Future research will use the developed tools to experiment with diverse possibilities to improve teaching and encourage more contemporary and compelling learning. Along the path of digitalization, the archive is becoming more interactive and allows students themselves to participate in adding new content by inserting their projects born from the structures learned through the archive. The archive thus becomes an evolving resource that nurtures itself with the knowledge it generates.

During the upcoming Academic Years, teachers of the Final Synthesis Studio in Knitwear Design and the Course in Digital Modelling for Knitwear at Politecnico di Milano will adopt Archivio Spadafora as a structural and fundamental learning tool alongside the theory learned on books and knitting machines.

Acknowledgements

The authors thank Piero Ruggeri and all Materioteca, Politecnico di Milano Library staff, where the Archivio Spadafora is kept today.

Elisa Rossi realized the Final Master Thesis research on which the following article is based, leading the project whose results are in paragraphs 4 and 5. Giovanni Maria Conti wrote paragraphs 1 and 6. Martina Motta wrote the abstract, parts 2 and 3.

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IV

BIOGRAPHIES

Giuseppe Amoruso

Associate Professor of Drawing and Measured Drawing at Politecnico di Milano. He was awarded a PhD in Drawing and Measured Drawing from the Polytechnic University of Marche. He edited over 150 essays and papers on digital media for design & heritage, town documentation, traditional architecture, and cultural and historic urban landscape.

In 2019 he co-edited the book "Cultural Landscape in Practice. Conservation vs. Emergencies" (with Rossella Salerno). He designed the colour code masterplan for the historical centre *façade* of Meldola and Morciano di Romagna and, recently, the proposal for reconstructing the centre of Amatrice after the earthquake. Chair of INTBAU ITALIA, International Network for Traditional Building Architecture & Urbanism, currently he is the director of the International Cooperation Program for the improvement and enhancement of the Folklore Museum, the Museum of Popular Traditions and the Roman Theater of Amman, documenting the 3D reconstruction of the Roman Theatre of Amman and developing the proposal for a "Digital Library of Living Traditions".

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She edited with Francesco E. Guida, also issue 23 of *PAD*, entitled *Digital Memories*.

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He holds a Master of Science in Architecture and serves as an Associate Professor of Interior Architecture and Exhibition Design at the Department of Architecture, Built Environment, and Construction Engineering (DABC) of Politecnico di Milano. With a PhD in Interior Architecture and Exhibition Design obtained in 2000, his specialization lies in the Theory and Design for the Conservation and Enhancement of Tangible and Intangible Cultural Heritage. He is an active member of the Faculty Board of the Architectural Urban Interior Design PhD program at Politecnico di Milano. He actively participates in specialized training programs on national and international platforms and contributes to specialization masters.

Additionally, he is the author and curator of numerous books and articles on Interior Architecture and Exhibition Design.

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Archaeologist and researcher in cultural heritage studies, with a focus on Middle Eastern Tangible and Intangible Heritage. Currently, she is a research fellow at Politecnico di Milano. Her work focuses on Traditional Handicrafts, the definition of the Cultural Landscape in Jordan, and Community Engagement strategies.

In 2018, she discussed a PhD at Università degli Studi di Roma La Sapienza about the economy and handicrafts of Ancient Mesopotamia. Since 2009 she has conducted researches and field campaigns in Jordan and Iraq, aiming at the reconstruction of the cultural landscape of past societies. She collaborated with several international projects conducted by the British Museum, the University of Cambridge, the Penn University Museum (Philadelphia, Pennsylvania), the Ludwig Maximilians Universität in Munich, and the American School of Oriental Research.

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PhD, Researcher at the Department of Design, Politecnico di Milano. She is an Imagis Lab research Lab member and Deputy Director of the Specializing Master in Brand Communication. Her research deals with new media and participatory culture to understand how multichannel phenomena (crossmedia and transmedia) change narrative environments' production, distribution, and consumption.

The fields of communication design, storytelling, and digital technologies have been investigated in research and educational activities to define processes, methods, and tools since 2010.

National and international publications include books, book chapters, journal articles, and conference proceedings on the transmedia phenomenon, communication strategies, the transformative power of stories, narrative formats (interactive narratives), and audiovisual artefacts.

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Diana Ciuffo

Independent architect and set designer, she studied Architecture in Porto (FAUP) and Rome (La Sapienza), graduating with honours in 2012. As a Leonardo Da Vinci fellow recipient, she moved to the Netherlands in 2013, where she started a long-lasting collaboration with several offices as a freelance architect. During the past Academic Years, she has been first assistant in the Sapienza Design Department (PDTA) and then Adjunct Professor in "Performing Arts and New Media Studio", currently enrolled in a PhD course at the same Department in the field of Urban Studies. Her projects stand mainly in the field of temporary architecture and scenic design (her installations have been set at: Teatro Biondo Palermo, Les Halles Schaerbeek Bruxelles, CSS Udine, TPE Torino, Milano Salone, Pergine and Oriente Occidente Festivals). The relationship between people, inhabitants, spectators and space is the main point of her research.

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PhD, Associate Professor, he is currently the Coordinator of Knitwear Design Lab – Knitlab of the Fashion Design Degree at the Politecnico di Milano. Founder and Scientific Coordinator of the website/blog www.knitlab.org, he was executive secretary of the Fashion Design Degree at the School of Design of Politecnico di Milano. He is Istituto Italo-Latino Americano (IILA) expert collaborator in the Pymes Forum for cooperation projects on textile and fashion. He is the director of the Master in Fashion Direction: Product Sustainability Management at MFI (Milano Fashion Institute consortium) and a member of LeNS - International Learning Network on Sustainability.

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She is a designer, researcher and educator. She currently teaches at Studio Image in the Major in Art at the Free University of Bozen-Bolzano, and at the Universität für künstlerische und industrielle Gestaltung Linz (Austria) as an adjunct lecturer in Visual Communication. She is a PhD candidate in the Interface Cultures Program at the UFG Linz and has been an artist in residence at the Jan van Eyck Academie in Maastricht (2015-16). She is on the editorial board of "Progetto Grafico" and collaborates with Museion, the Museum of Contemporary Art in Bolzano as a member of the Art Club.

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Vincenzo Cristallo

He is an Associate Professor of Industrial Design at the Politecnico di Bari. His published books and essays reflect a research activity focused on studying contemporary design and its impact on regional development. In recent years, his scholarly interests have shifted towards the design of infographic languages and their role in facilitating knowledge access.

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Raissa D'Uffizi

She holds a Bachelor's degree in Industrial Design and a Master's in Design, Visual and Multimedia Communication. She is currently enrolled in the PhD in Planning, Design and Architecture Technology" at the Università degli Studi di Roma La Sapienza. Her research investigates the mediation between objects of Italian design and consumers by reflecting on

the evolution of their communication within design magazines (1949-1977). She worked as a graphic designer at Studio Davide Perez Medina (Madrid) and NOAO Studio (Rome). She curated editorial and graphic design projects for international institutions, such as the recent *UNESCO art collection: selected works* (2021). She also has engaged in research projects on the themes of the history of design and visual communication, like *From Dreams to Abandonment: Lina Bo and the Culture of Living in Italy (1939-1946)*, published by *AIS/Design Journal* (2021) or the participation in the editorial project *La Milano che disegna* (2020), on the knowledge of design archives in Milan.

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He is a PhD student in Design Sciences at the Università Iuav di Venezia. He was previously a research fellow at the same institute. His research relates to the design of materials, focusing on the meaning of materials as sources of cultural meanings. He is also a lecturing collaborator, focusing on design for the sustainable management of production by-products and materials resources as contextual actors.

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Specialized in theatrical architecture and interested in exploring the expressive possibilities of new digital cultures, she has worked in exhibit design with museum and multimedia set-up projects and site-specific interventions. Some projects carried out as a co-designer: *Racconti (IN)visibili* (2021); *110 anni della SAM* (2018); *MUUD - Nuovo Museo Nazionale della Daunia* (2016); *Det Elektriske Akvariet* (2016); *Progetto per Nuovo Teatro Comunale di Empoli* (2022); *Cantieri Teatrali Koreja; Nuovo Teatro Comunale Ruvo di Puglia* (2017); *Nuovo Teatro Abeliano* (2012).

She is also a Contract Professor of the Performing Arts and New Media studio of the MA in Design, Multimedia and visual communication at the Faculty of Architecture of the Università degli Studi di Roma La Sapienza.

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Scientific coordinator of the Documentation Center on Graphic Design of AIAP, he is a member of the editorial committee of *PAD. Pages on Arts and Design* and past associate editor of *AIS/Design Journal. Storia e Ricerche*.

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Motion Designer and PhD Vincenzo Maselli is a Research Fellow in communication design at the Università degli Studi di Roma La Sapienza and a lecturer in motion graphics at the Università G. D'Annunzio di Chieti-Pescara. His research focuses on motion design and animation with a specific interest in puppetry and stop-motion, studied as fields of technological experimentation and media tools. On these topics, he authored several publications, among which the book *Anatomy of a Puppet. Design driven categories for animated puppets' skin* (2020) and the article *Performance of Puppets' Skin Material: The Metadiegetic Narrative Level of Animated Puppets' Material Surface* (2019), which received the Norman McLaren-Evelyn Lambart Award for "Best Scholarly Article on Animation" in 2020. In 2021 he won the BE-FOR-ERC starting grant for the interdisciplinary research CCODE - Design, material experiences and stop-motion animation as didactic tools for developing creative thinking and cooperative learning.

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Marco Mason

He is a senior lecturer and design researcher affiliated with the School of Design at Northumbria University, United Kingdom. Holding a PhD in Design Sciences since 2012, his specialization lies in Digital Cultural Heritage Design. His research and teaching experience spans prestigious research centres, including the luav Faculty of Arts and Design in Italy, the Massachusetts Institute of Technology in the USA, the School of Museum Studies in Leicester, UK, the University of Cambridge, and presently, Northumbria School of Design in the UK. His research explores the convergence of Digital Cultural Heritage, Design, and Organizational studies, specifically focusing on human-centred design methodologies like Design Thinking and Service Design. This extends to their applications within cultural heritage institutions, encompassing the realm of visitor experience design involving technologies such as Apps, AR, VR, Wearable Tech, and AI. He is also engaged in researching Museums' Digital Transformation through a design-centric approach.

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PhD cum laude in Design, she is a Research Fellow at the Design Department of Politecnico di Milano. As a faculty member, she teaches at the School of Design of Politecnico di Milano, in the FIT in Milan program of the Fashion Institute of Technology (NY), and at Milano Fashion Institute.

Her teaching and research activity focuses on knitwear and textile design, mainly on the convergence of traditional techniques with advanced technologies, the evolution of the digital representation of textile products and the enhancement of sustainable design, processes and products.

She has been a visiting researcher and teacher at Birmingham City University, at the Swedish School of Textile and the Faculty of Architecture in Lisbon, and taught in several other international workshops.

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Graduated cum laude in the master course "Design for the Fashion System" at Politecnico di Milano, she is currently working as a knitwear designer assistant in the Italian brand Loro Piana.

Her university career focused on knitwear, attending the knitwear design studio during the last year of her Bachelor's. The same year, she participated in the international competition "Feel The Yarn", realizing two knitwear outfits, then

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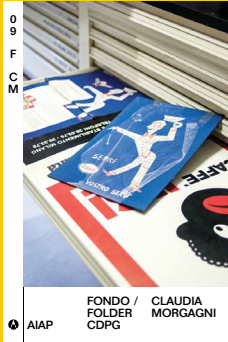
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PAD. Pages on Arts and Design

International, peer-reviewed,
open access journal
ISSN 1972-7887

#24, Vol. 16, June 2023

www.padjournal.net



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associazione italiana design
della comunicazione visiva