Sep 22nd, 9:00 AM - Sep 24th, 5:00 PM

Algorithmic-narrative machine. Micro-history of a dialogic-constructionist design lab

Francesco Monterosso
Università degli Studi di Palermo - DARCH - Dipartimento di Architettura

Citation

Monterosso, F.(2025) Algorithmic-narrative machine. Micro-history of a dialogic-constructionist design lab, in Clemente, V., Gomes, G., Reis, M., Félix, S., Ala, S., Jones, D. (eds.), *Learn X Design 2025*, 22-24 September 2025, Aveiro, Portugal. https://doi.org/10.21606/drslxd.2025.076

learn intertwinia in design education design
22-24 sep.'25
university of aveiro · portugal
Design Research Society DRS

Algorithmic-narrative machine. Micro-history of a *dialogic-constructionist* design lab

Francesco MONTEROSSO
DARCH | Dipartimento di Architettura
Università degli Studi di Palermo
francesco.monterosso@unipa.it

10.21606/drslxd.2025.076

Abstract: This contribution explores the interplay between design culture and constructionist pedagogy, highlighting how practices based on making, tinkering, and learning by doing can foster creative, collaborative, reflective, and critical learning in increasingly interconnected educational contexts. Following in the footsteps of the work and research carried out by Papert, Stager, and other scholars, it emphasizes the necessity of an inclusive, transdisciplinary approach in line with the challenges posed by the future of design education.
After a brief theoretical overview—citing "designerly ways of knowing" and underscoring the importance of a dialogic, project-based epistemology—the paper presents an educational-design experience developed within the Inter/Abit/Azione project. This effort culminated in the creation of a robotic "artist" arm and an "algorithmic-narrative machine" for the Casa/Grotta in Vico Solitario, Matera, during the city's tenure as the 2019 European Capital of Culture. Developed at a school in the Modena area, the initiative drew on Papert/Stager's Constructionist Learning Laboratories and the Wunderfab experience in Bolzano. It was an experimental educational project that combined the pedagogical experimentation of a "dialogic-constructionist" lab with design culture and practices aimed at connecting technologies, communities, and cultural heritage.
Through this experience, the principles and methods that foster collaboration across diverse fields came to light, addressing tensions and challenges amid growing social and technological complexity. The result was a model of design education intertwining knowledge with real-world contexts, where errors and critical thinking serve as drivers for sustainable innovation and widespread civic responsibility. The ultimate goal was to build new possible connections between the present and the future, fostering the emergence of an Intertwinia between different forms of knowledge, in which design becomes a catalyst for knowledge and social transformation.

Keywords: *design to learn, design for education, dialogic design, design for Cultural Heritage, connected heritages*

1. Introduction "Bread, design and pedagogy"

This contribution is set within a framework of theoretical reflections exploring some complex connections between design culture and *constructionist* pedagogy, in the wake of Seymour Papert's experiences and the "invent to learn" approach developed by Gary Stager (his student), which are grounded in making and tinkering practices. The following is a presentation of a teaching-design experience developed within the broader *Inter/Abit/Azione* project, which involved creating an *artist* robotic arm and an *algorithmic-narrative* machine for the historic Casa/Grotta in Vico Solitario - a micro museum in Matera - on the occasion of *Matera 2019 European Capital of Culture*. This educational project was carried out in a school in the Modena area through the realization of a creative, informal, collaborative,

and reflective learning environment, inspired by Papert and Stager's *Constructionist Learning Laboratories* and by the *Wunderfab* in Bolzano, implemented as part of the EDDES research [1] (Camuffo & Dalla Mura, 2016, p. 215).

This project has deep roots, closely connected to the author's autobiographical dimension—both of the paper and of the project itself—who was raised on "bread and pedagogy" as the child of a "master-artisan" (Camuffo & Bombardi, 2016) and a "street teacher" (Lorenzoni, 2016). Together with many other anonymous "rebellious and countercurrent educators" (Lorenzoni, 2016), they helped shape what has been called the "real" and high-quality school system in Italy [2]. These roots found both *humus* and fertile ground in the extraordinary cultural and pedagogical ecosystem of innovative and design-oriented teaching practices that define the DNA of the so-called "pedagogical districts" of the Emilia region—now internationally recognized—such as *Reggio Children*, the *Loris Malaguzzi Centre*, FEM - *Future Education Modena*, and the *Marconi TSI Service* of the *Regional Education Office of Emilia-Romagna*. It was precisely through the fertile collaboration with Roberto Bondi [3] and Alessandra Serra [4] from the *Marconi Service* that it became possible to launch—among many initiatives [Figure 1]—the idea of a *dialogic-constructionist* design laboratory. This laboratory took shape through a productive exchange of knowledge and reflection, becoming an experimental space for exploring the relationship between design and pedagogy, now emerging as a rich and challenging disciplinary research domain. In this sense, the experience became an opportunity for a multi-voiced reflection, seeking to explore a series of research questions and hypotheses:

• How and to what extent can design culture influence educational practices—particularly STEAM-based approaches—within the context of compulsory schooling (at least in Italy)?

• Can a methodological approach grounded in designerly ways of knowing (Cross, 1982), intertwined with constructionist pedagogical practices, be systematically applied across the full 03–16 age range in education to address increasing social and technological complexity and meet the challenges of future learning?

• What kinds of benefits can emerge from this "design–pedagogy" relationship, especially when applied in socially and/or geographically fragile contexts, in what bell hooks (2020, 2022) calls "marginal and radical" spaces—such as those in Italy and the broader Mediterranean region—marked by the systematic erosion of social capital and cultural heritage, both tangible and intangible?

• Finally, how many and what kinds of innovations can be generated through the integration of design knowledge and heritage culture in the formation of future generations?

Figure 1 - Educational and cultural/scientific engagement activities, plus "lab tests" with the educational community in Maranello (Modena). All images and graphics are by the author.

2. Constructionists, Tinkerers, Designers. Toward a Design-Oriented Mathetics

"Learning is not so much about acquiring and transmitting information, but about collectively designing a world worth living in". Edith Ackermann (cited in Martinez & Stager, 2021, p. 15) (tba)

Edgar Morin (2000) reminds us how essential it is to reorganize educational systems by starting with a "reform of thought" and knowledge—one that transcends hyper-specialization and the fragmentation of knowledge—to more effectively address the complexity of today's major multidimensional and global challenges (Morin, 2017). According to Floridi, this complexity demands an innovative and revolutionary philosophical approach called "conceptual design," strongly characterized by the pragmatic and poietic dimension typical of design cultures. Surpassing the dichotomy between *techné* and *epistème*—practical and theoretical knowledge—"philosophy as conceptual design" moves toward "a *constructionist* framework: shifting from a *user-based approach* to knowledge toward a *builder-based approach*" (Floridi, 2020, pp. 97–98). This *constructionist* philosophy opens itself to the specific disciplinary approaches of other fields—design foremost among them—that do not merely "*know* but also *build* the object or *semantic artifact* of interest, which then becomes the mediator of the acquired knowledge" (Floridi, 2020, p. 110). This paradigmatic and epochal shift in epistemology has significantly transformed our understanding of knowledge and learning processes. Indeed, recent developments in the educational sciences reflect this direction, with a growing number of scholars stressing the need for a *design turn* in educational practices. This *turn* is clearly related to the *pedagogical* tradition of design culture (basic and new basic design), the practices linked to *design thinking* (and its variations), and the fruitful inter-trans-multi-disciplinary crossovers between design and the learning sciences, which—from constructivism—have led to Papert's *constructionist* pedagogy, computational thinking, making, tinkering, and STEAM education.
Jean Piaget's contribution was pivotal in this paradigm shift. Building on the reflections and experiences of Dewey, Montessori, and other scholars, Piaget systematized a theory of learning—Constructivism—whereby learners create knowledge not "through the mere transmission of information by others, but through an internal process of meaning-making by the learner themselves" (tba) (Martinez & Stager, 2021, p. 31).

2.1 Instructionism vs Constructivism

From Constructivism emerged the thought and work of Seymour Papert—mathematician, computer scientist, educator, and MIT professor. A student and later colleague of Piaget, Papert developed an educational theory over the years known as Constructionism, according to which learning is most effective when students, drawing on real-world experience, are actively involved in building something meaningful and tangible. In doing so, they structure their knowledge in parallel with constructing objects—*cognitive artifacts* or, in Floridi's terms (2020), "semantic artifacts"—that act as vehicles for learning, useful for developing knowledge and skills. According to this pedagogical perspective, Constructionism promotes an approach based on "using to learn" (Capponi, 2008, p. 73), where learning occurs through the active use of materials and tools, as opposed to a didactic approach of "learning to use" (Capponi, 2008, p. 73) which favors the traditional transmission and reception of abstract notions.
As Capponi (2008, p. 50) notes, "this shift has led […] to a growing acknowledgment of the importance of the concept of learning over that of teaching" (tba). Accordingly, the teacher's role changes from knowledge transmitter to learning facilitator, recognizing the importance of active student engagement in the educational process, overturning a long-standing epistemological and pedagogical dichotomy that favored instructionism—an approach highlighting the reasons for teaching—at the expense of constructionism, where the reasons for learning instead take center stage.

2.2 From "pedagogy of error" to Constructivism

With Papert and Constructionism, in fact, it is "Mathetics", or the "Art of learning" [5] (Capponi, 2008, p. 50), that is emphasized. The teacher-facilitator places themselves in a "zone of proximal development" [6], a concept Papert inherits from Vygotsky, maintaining the necessary distance to avoid becoming the undisputed protagonist or "teacher-manager" (Martinez & Stager, 2021, p. 62). Rather, they become a "teacher-doctor-designer" (Ackermann, 2003), or a "learning companion" (Ackermann, 2003) who helps the student realize their highest learning potential. This posture is the only way to ensure a context or learning environment that, for Papert, takes shape as an engaging "cognitive gym" (Capponi, 2008, p. 74), where it is possible to iteratively search for problems and solutions through problem finding and problem solving. This method translates into a spiral process of continual adjustments, wherein errors are an integral part of the learning process. Instead of viewing mistakes as failures, Papert's "pedagogy of error" (Serra, 2021) regards them as opportunities for growth, exploration, and deep, meaningful understanding of the real world. This approach seeks to foster autonomy, creativity, and resilience in students, who—within a non-judgmental, gender-equal, and inclusive environment—are encouraged to take initiative, to act, to experiment, to explore, to tinker (both

playfully and reflectively) in practical, hands-on activities that promote active learning through doing, curiosity and innovation.
Papert associates this approach with that of the *bricoleur*, the tinkerer, the repairer, the *armeggiatore* (in contrast to the "planner"). It is a genuine open, dialogic, and interactive design methodology enabling constant adaptation to the immediate situation—a design-driven approach which, in Schön's words (1993, p. 101), constitutes "a reflective conversation with the situation". It mirrors exactly how designers engage in a constant and iterative dialogical relationship both with the artifacts they create and the contexts in which those artifacts exist.
And there is more. As Edith Ackermann (Ackermann & Strohecker, 1999) points out, "the conversational turn toward constructing personally meaningful products" within a context or learning environment, following the modes of these "tinkerer-designer-children" goes beyond the relationship with the artifact. This is because a tinkerer, a designer, or a student is never alone: they carry within a plurality of voices that reflect the influences, suggestions, critiques, and ideas of others. This social and interactive dimension of conversation and dialogue—defined by Ackermann and Strohecker (1999) as "constructive-dialogical interaction"—triggers mechanisms of partnership and cooperation, as well as support and empathy.
In short, it is a "dialogical practice" (Braghero, 2019) and a "community" approach (Manzini, 2016, 2018; Varini, 2019) that, also through a playful and utopian dimension unique to design culture, provides an ideal framework "for developing the desire and ability to dream and imagine new possible worlds" (tba) (Martinez & Stager, 2021, p. 64).

3. A *dialogic-constructionist* (design-driven) methodological approach to connect communities and cultural heritage.

In continuity with the concise, non-exhaustive theoretical reflections presented in the previous section, this brief account illustrates the research and experimentation that evolved around the idea of creating a "dialogic-constructionist" design lab. This lab was conceived as a creative, informal, collaborative, and reflective learning environment inspired by the model of the "Constructionist Learning Laboratories" developed by Stager (2005)—with whom the author had the opportunity to engage during a training workshop—and then *critically filtered* through the "Wunderfab" experience led by Simone Simonelli, as part of the broader EDDES research project (Camuffo & Dalla Mura, 2016). It was a laboratory inspired by a "kindergarten approach to learning" (Resnick, 2007) — characterized by a methodological cycle that can be summarized as imagine, create, play, share, reflect, and imagine again — blending pedagogical-educational experimentation with the research and practices of design culture, and more specifically, with those of "design for cultural heritage and territories". The methodological approach of design for cultural heritage and territories (Lupo, 2009; Parente & Sedini, 2018) shares numerous points of contact with the "kindergarten approach to learning" proposed by Mitchel Resnick (2007), while differing in terms of objectives, target audiences, and epistemological frameworks.
Both models emphasize learning through making, understood as a concrete, project-based, and reflective experience. The centrality of *learning by doing* translates, in both cases, into exploratory, creative, and collaborative practices aimed at constructing meaning through interaction with materials, tools, and contexts. In this sense, design for heritage and the "kindergarten approach" both adopt a *constructionist orientation*, grounded in active and situated learning.
Another point of continuity is the social and dialogic dimension of learning: both approaches foster cooperative, inclusive environments that are open to diverse perspectives and encourage co-creation of knowledge. In Resnick's model, this takes place within informal educational settings (e.g., FabLabs, coding and making environments), while in design for heritage it is realized through co-design practices with local communities and stakeholders.
However, there are some substantial differences. The "kindergarten approach" was originally conceived for early childhood education and focuses on developing individual creative autonomy within playful and digital environments. In contrast, design for heritage addresses more complex educational, cultural, and territorial contexts, engaging university students, professionals, and local communities in processes of civic and cultural activation.
From a methodological standpoint, Resnick's model privileges an open-ended, exploratory process, whereas design for heritage follows a systemic and context-sensitive design logic, oriented toward heritage enhancement, territorial regeneration, and situated cultural production. In the latter case, design becomes a strategic tool, a transformative device for the real world, capable of generating long-term social and cultural impact (Figure 2).

	Kindergarten approach (Resnick)	Design for heritage (Lupo, Parente, Sedini)
Purpose	Creative and personal development	Cultural and territorial activation
Context	Informal education / children	Situated design / communities and territories
Method	Play, exploration, sharing	Action research, co-design, activation
Epistemology	Constructionism (Papert)	Systemic design, design culture
Materials & Tools	Digital, tinkering, making	Mapping, storytelling, service design
Outcomes	Personal prototypes / experiential learning	Local interventions, cultural devices, services

Figure 2 - Summary table of the mediation between methodological approaches (Kindergarten approach / Design for Heritages approach).

The project thus involved mixing and hybridizing two methodological approaches that, despite emerging from distinct epistemological frameworks, reveal meaningful points of intersection. The "kindergarten approach" is rooted in digital constructionism and informal education, while design for heritage draws from service design, strategic design, and heritage studies, positioning itself as an interdisciplinary and trans-scalar practice.
Nevertheless, despite their different origins, both approaches share a common vision of design as an educational, creative, and transformative practice, capable of generating learning, meaning, and relationality – especially when working in socially and/or geographically fragile contexts, in what might be defined as "marginal and radical" areas such as those found in Italy (and the Mediterranean region more broadly), which are increasingly affected by the systematic erosion of social capital and cultural heritage. These are territories at serious risk of disappearing, and towards which it is necessary to adopt a strong civic and social responsibility.

3.1 A design-based educational experience between Maranello (Modena) and Matera

More specifically, this experience took shape within the *Inter/Abit/Azione* project coordinated by the artist Francesco Finotti, which focused on creating a *primitive* robotic arm curated by the maker community of FabLab Casa Corsini in Fiorano Modenese. The robotic arm, named Fanny, is guided by an artificial intelligence algorithm *trained* by the educational communities in Maranello and Matera. It is capable of producing a new kind of cave painting (ultraviolet light on photosensitive screens) inside the historic Casa/Grotta of Vico Solitario on the occasion of *Matera 2019 European Capital of Culture*. The same Casa/Grotta also housed a small installation—a kind of *algorithmic-narrative machine* conceived and built by young *designer-makers* from I.C. *Ing. Carlo Stradi* in Maranello together with students from I.C. *G. Minozzi - N. Festa* in Matera. (Figure 3)

Figure 3 - Young designers and makers from I.C Ing. Carlo Stradi in Maranello (Modena).

It was the final outcome of the *dialogic-constructionist design lab*, coordinated and conducted by the author of this contribution (in the role of researcher-designer, teacher, and digital facilitator at I.C. *Ing. Carlo Stradi*), alongside

Massimo Cristiano (engineer-maker and teacher at the same school), Francesco Finotti (artist and art director of *Inter/Abit/Azione*), and Enrica Amplo (aka Tata Robotica, an expert in educational electronics). (Figure 4)

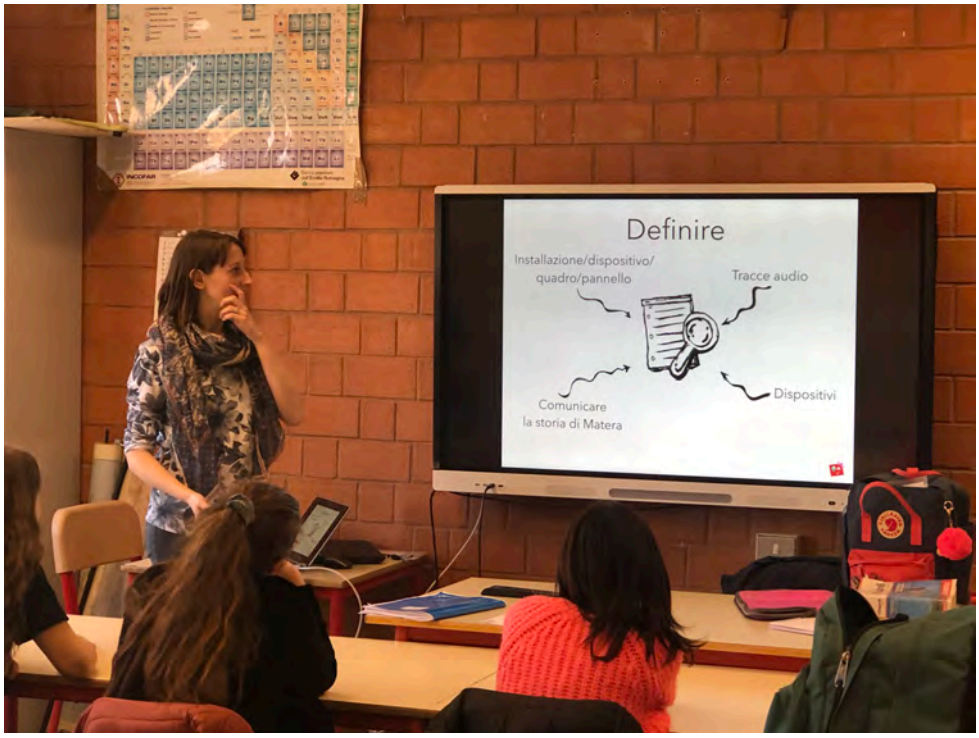

Figure 4 - Defining the project objectives with Enrica Amplo (Tata Robotica)

Figure 5 - Makers in action building the "algorithmic-narrative" machine

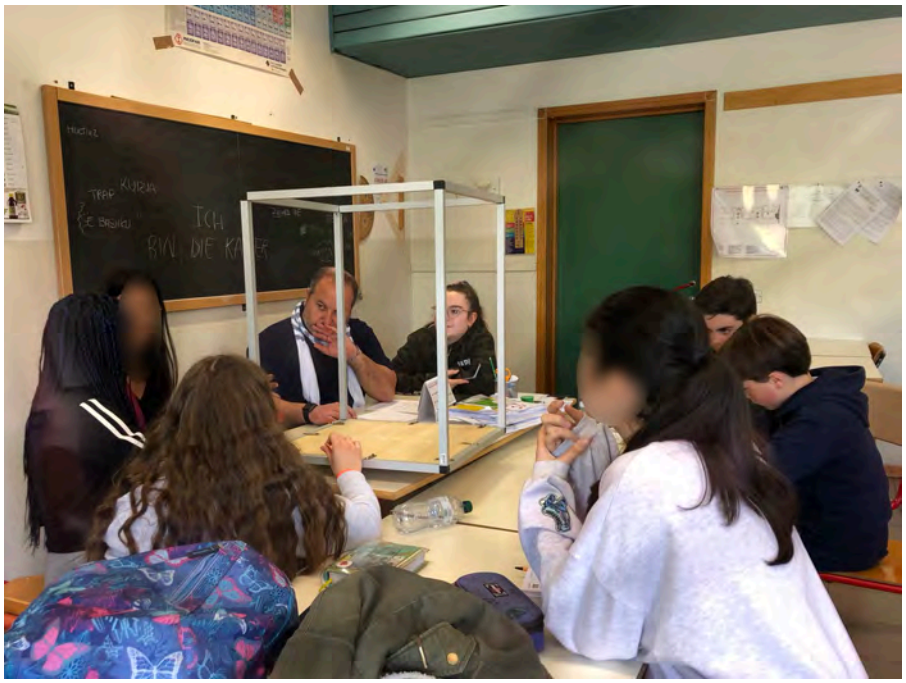

Figure 6 - Developing narrative contents and graphic interfaces

This multifaceted, engaging project involved various institutions, companies (from the *Ceramic District* of Sassuolo), and communities in the Emilia-Romagna and Basilicata regions, fostering an original and fruitful dialogue that merged humanistic and technological culture, robotics and archaeology, computer science and history, engineering and art, design and pedagogy. The crosscutting objective was to "connect cultural heritages" (Monterosso, 2022) by enhancing the unique expertise, know-how, and territorial and social capital of the two areas involved—rooted, on the one hand, in historical and anthropological heritage (Matera), and on the other, in pedagogical research and cutting-edge technology (Maranello/Modena).
Touching Matera's History – I Sassi Postano was the name given to the workshop in which the *algorithmic-narrative machine* was conceived and built. This name is a clear reference to *M.A.D.* by Maddalena Della Mura (Camuffo, 2021, p. 95) and represents an analog-digital hybrid artifact. By means of a programmable microcontroller, it can interact with museum visitors who *consult* it to discover and learn about the hidden stories of certain Matera neighborhoods. Comparable to a kind of rotating, talking interactive box, the *machine* is composed of four panels that become touch-sensitive through the use of conductive inks, allowing people to activate brief narratives of lived experiences among the *Sassi* (Matera)—stories recorded by students at IC G. Minozzi - N. Festa in Matera. (Figure 7)

Figure 7 - Programming and functionality testing with Enrica Amplo (Tata Robotica)

Figure 8 - Applying conductive ink and adding final touches

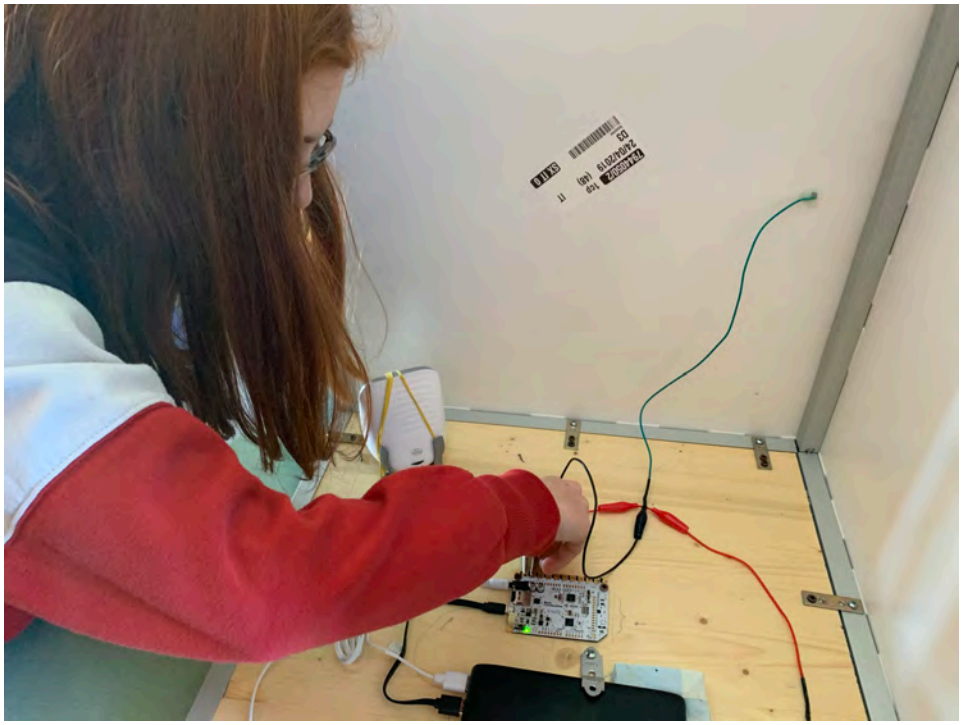

Figure 9 - Codegirl in action for debugging and final functionality checks

The graphics on these panels mimic the Instagram interface (Figure 8) but invert its usual operating logic. Through a critical lens, the young designer-makers from Maranello decided to subvert the often-dystopian use of overbearing social media algorithms, imagining ways to move them away from an "extractive" (Iaconesi & Persico, 2021) consumerist model toward new, more original applications. As a result, they created a narrative pro-object that is also "infospheric" (to borrow from Floridi), through which the communities who designed it utilized technology and information within a contemporary ethical and open-source framework. In doing so, they also discovered how designers can envision new ethical algorithms that care for cultural heritage sites—such as Matera, a UNESCO World Heritage city—for which they assumed an important civic responsibility, helping prevent the loss of collective memory

tied to an extraordinary intangible heritage of stories and lived experiences now tragically at risk of survival or disappearing. (Figure 9-10)

3.2 The experience in the reflections of the young makers/designers

The reflections collected at the end of the workshop confirm the effectiveness of the dialogic-constructionist approach in fostering active engagement, a sense of belonging, and critical awareness among participants. Students highlighted how learning through making helped them understand complex concepts—often perceived as abstract in traditional teaching—while also enhancing motivation and participation.

The collaborative and non-competitive dimension of the workshop was perceived as a key factor in creating an inclusive environment, where each participant could contribute authentically to the design process. Particularly meaningful was the relationship between design and place, which enabled young participants to rediscover and revalue both their own and others' living environments, generating a renewed perspective on local and national cultural heritage and its transformative potential.

Finally, the experience led participants to develop a broader understanding of design—not merely as a formal or aesthetic practice, but as a relational, social, and civic tool, capable of activating listening, respect, and responsibility. In this sense, the workshop became a fertile space for the emergence of a conscious, dialogic form of design citizenship. To further support these observations, it may be useful to share a few selected reflections collected during the debriefing sessions. These were later featured in a short video documentary presented at various public dissemination events:

Andrea, Moussa & Filippo

I realized that learning by doing is a thousand times more engaging and fun than just listening to a lesson. When we built the prototype, I finally understood concepts that used to feel too theoretical. For the first time, I was the one teaching others how to work with wood and aluminum. (Figure 5-6)

Riccardo, Mattia, Giovanni & Massimo

It was great to work with others without any sense of competition. We built a project together, and everyone brought something unique. I wish school always worked like that.

Iris, Akua, Denise & Immacoulè

For the first time at school, I felt like my voice truly mattered. There wasn't a single right answer, but many possibilities. We designed together, by listening to one another, and that made me feel part of something meaningful.

Alessia, Juliana, Elena & Alessia

Working with the cultural heritage of my city and connecting it with that of the students in Matera made me see my own world with new eyes. I used to think there was nothing interesting here… instead, we rediscovered incredible stories.

Chiara, Rebecca, Eleonora & Alex

This workshop helped me realize that design isn't just about making things look good—it's about finding solutions to people's problems. It's a form of listening, of respect, and even a kind of positive rebellion.

Figure 10 - Project presentation at the Casa/Grotta Museum in Vico Solitario during Matera 2019 European Capital of Culture

4. Conclusions - From “cognitive artefacts” to “narrative machines for the real world”

The educational experience presented in this contribution demonstrates the potential of a *dialogic-constructionist approach*—anchored in design culture and constructionist pedagogy—to foster meaningful, creative, and socially engaged learning in complex, real-world contexts. By intertwining theoretical reflection, hands-on experimentation, and community engagement, the project gave rise to a hybrid and transdisciplinary educational model, capable of responding to the epistemological, technological, and civic challenges of contemporary learning.

Central to this model is the recognition of design as an educational and cultural catalyst, able to connect heterogeneous domains—technological and humanistic, local and global, formal and informal—through a shared process of inquiry, making, and reflection. The construction of narrative machines such as the algorithmic-narrative device in Matera is not merely a technical outcome, but a semantic artefact in Floridi’s (2020) terms: a mediating object that materializes and communicates knowledge, memory, and values. These artefacts are the result of collective authorship, where students, teachers, designers, and local actors co-create meaning by embedding personal and shared stories into tangible, interactive forms.

From a methodological perspective, this work highlights the value of designerly ways of knowing (Cross, 1982) as a generative epistemology within educational contexts. When combined with Papert’s constructionism, this approach affirms the importance of learning environments that are open, inclusive, iterative, and oriented toward problem-finding rather than mere problem-solving. In such settings, error becomes opportunity, and design becomes a tool of care—for people, places, and heritage.

The project itself was structured as an educational experimentation and research process based on a design-oriented mathetics, shaped by a specific and original approach to knowledge construction mediated by the criteria, tools, and purposes of design culture. As articulated by Nigel Cross (1982), this “third culture” represents an educational area that stands alongside the humanistic and scientific traditions—long dominant in educational and social systems—and which should increasingly be recognized as a core component of general, not merely specialist, education (Cross, 1982, p. 221).

Within this framework, the “algorithmic-narrative machine” emerged as a carrier of intrinsic values, intimately tied to the object itself. It embodies a dual identity: as a cognitive-semantic artefact—a meaningful learning tool for understanding key concepts across disciplines (humanistic, scientific, technological, artistic)—and as a real-world narrative product, the tangible outcome of powerful ideas and what Papert called “hard fun.” Importantly, this machine had to pass the most demanding of tests: its public reception within a museum institution located in a globally significant, UNESCO World Heritage site like Matera. Designed for and tested by real users, the machine affirms its informational, pedagogical, and civic relevance.

Perhaps the most profound contribution of this experience lies in the dialogic, collaborative, inclusive, and egalitarian nature of the process. Developed in a multicultural and multiethnic context, the workshop saw girls and boys with diverse backgrounds and skills confront the complexity of the contemporary world through a shared design project. As Edgar Morin (2015, p. 127) reminds us, such educational environments help individuals “develop both their individuality and their ties to others [in order to] prepare to face the many uncertainties and difficulties of the human condition” (tba).

Most importantly, this experience exemplifies how design-led education can contribute to the formation of critical, empathetic, and responsible citizenship. In socially and/or geographically fragile contexts, the convergence of design practice and pedagogical intention supports not only the acquisition of knowledge and skills, but also the development of ethical and relational dispositions toward the world. As the reflections of students confirm, this is not only about what they learned, but also about how they became aware of their agency and capacity to shape the future.

In conclusion, this experience invites us to rethink design education as a civic and transformative act—a space where ideas, hands, and communities come together to co-create knowledge and to build, quite literally, new possible worlds. The educational design lab becomes a living infrastructure of Intertwinia, where diverse knowledges, identities, and narratives intersect, and where learning is not merely about “knowing”, but about “becoming”.

References

Ackermann, E. (2003). Hidden drivers of pedagogic transactions: Teachers as clinicians and designers. In *Be creative...Reinventing technologies in education*. *Proceedings of 9th European Logo Conference*, CNOTINFO, Portugal. (pp 29-38).

Ackermann, E., Strohecker C. (1999). *Build, Launch, Convene. Sketches for Constructive-Dialogic Learning Environments*. TR99 - 30 April 1999 - MERL- A MITSUBISHI ELECTRIC RESEARCH LABORATORY. DOI: 10.13140/RG.2.1.3540.0807

Braghero, M. (2019). Finland. An educational community that works: Trust, dialogue, professionalism. In A. Giannelli (Ed.), *Rivoluzionare la scuola con gentilezza* (p. 232). Milano, Italy: Angelo Guerini Associati.

Camuffo, G. (Ed.) (2021). *Macchine per disegnare*. Mantova, Italy: Corraini.

Camuffo, G., Bombardi, F. (Eds.) (2023). *Le macchine del maestro Paolini*. Milano, Italy: Lazy Dog Press.

Camuffo, G., Dalla Mura, M. (2016). *Design e apprendimento creativo*. Milano, Italy: Guerini e Associati.

Capponi, M. (2008). *Un giocattolo per la mente*. Perugia, Italy: Morlacchi.

Cross, N. (1982). Designerly ways of knowing. *Design Studies* vol. 3, n. 4. (pp 221-227).

Floridi, L. (2020). *Pensare l'infosfera. La filosofia come design concettuale*. Milano, Italy: Raffaello Cortina.

Freire, P. (2008). *Pedagogia della speranza. Un nuovo approccio alla Pedagogia degli oppressi*, Torino, Italy: EGA. (ediz. or.: *Pedagogia da Esperança. Un reencuentro con la pedagogia del oprimido*, Paz e Terra, Rio de Janeiro 1992).

hooks, b. (2020). *Insegnare a trasgredire*. Milano, Italy: Meltemi.

hooks, b. (2022). *Insegnare comunità. Una pedagogia della speranza*. Milano, Italy: Meltemi.

Iaconesi, S., Persico, O. (2021). *Incuria*. Bologna, Italy: Luca Sossella.

Lorenzoni, F. (2023). *Educare controvento*. Palermo, Italy: Sellerio.

Lupo, E. (2009). *Il design per i beni culturali*. Milano, Italy: Franco Angeli.

Manzini, E. (2016). Design culture and dialogic design. *Design Issues, 32*(1), Winter. https://doi.org/10.1162/DESI_a_00364

Manzini, E. (2018). *Politiche del quotidiano*. Roma, Italy: Edizioni di Comunità.

Martinez, S. L., Stager, G. (2021). *Inventando si impara*. Roma, Italy: Carocci.

Monterosso, F. (2022). "Design and connected heritages. From the Mediterranean to Infosphere", in Di Dio, S., Filippi, M., Inzerillo, B., Monterosso, F., Russo, D., Schillaci, D. (eds), A Connected World. Designing new methods, tools and solutions to link people together and save the planet (pp. 82-96). Palermo, University Press, 2022. https://dx.doi.org/10.19229/978-88-5509-484-9/10122023

Morin, E. (2000). *La testa ben fatta*. Milano, Italy: Raffaello Cortina.

Morin, E. (2015). *Insegnare a vivere*. Milano, Italy: Raffaello Cortina.

Morin, E. (2017). *La sfida della complessità*. Firenze, Italy: Le Lettere.

Parente, M., Sedini, C. (2018). *Design per i territori*. Trento, Italy: LIStLab Edizioni.

Resnick, M. (2007). All I really need to know (about creative thinking) I learned (by studying how children learn). In *Kindergarten. Proceedings of the 6th ACM SIGCHI Conference* (pp. 1–6). DOI: 10.1145/1254960.1254961

Serra, A. (2021, July 15). *Istruire o… costruire? Tinkering, costruttivismo e costruzionismo*. USR Emilia-Romagna - Servizio Marconi TSI. Retrieved november 15, 2024, from https://serviziomarconi.istruzioneer.gov.it/2021/07/15/serra-istruireocostuire/

Shön, D. (1993). *Il professionista riflessivo*. Bari, Italy: Dedalo.

Stager, G. (2005). Papertian constructionism and the design of productive contexts for learning. *Proceedings of EuroLogo X*, Poland, 1–11.

Varini, R. (2019). Design di comunità, spazi soglia tra persone e territori. In G. Sinni (Ed.), *Atti del Convegno Designing Civic Consciousness/ABC per la costruzione della coscienza civile – San Marino 2018* (pp. 235–236). Macerata, Italy: Quodlibet.

Notes

[1] *Educating through/with design: stimulating creative learning in museum and school* contexts is a research project at the University of Bolzano coordinated by G. Camuffo and M. Dalla Mura.

[2] Here, the reference is to the countless micro-stories and teaching experiences—anonymous, certainly marginal, and «off the celebrity radar» (Lorenzoni, 2016)—shaped by a «pedagogy of hope» (Freire, 2008) and by «dialogic/community-based practices», as we might describe them today drawing on Braghero (2019), Manzini (2016, 2018), and Varini (2019). These practices have been implemented primarily in complex, «marginal and radical» contexts (Hooks, 2020, 2022), such as those found across the Mediterranean region.

[3] He is a teacher and coordinator of the *Servizio Marconi TSI* at the Regional Education Office (USR) for Emilia-Romagna.

[4] She is a teacher, PNSD trainer, and member of the Servizio Marconi TSI at the Regional Education Office (USR) for Emilia-Romagna. An expert in active teaching methodologies, robotics, tinkering, making, and coding, she has led numerous workshops throughout Italy.

[5] *Mathetics* can be defined as the *science of learning*, in contrast to didactics, conceived as the *science of teaching*. Derived from the Greek *mathēmatikos*, meaning *inclined to learn*, mathetics is central to Papert's Constructionist pedagogy.

[6] The concept of the "zone of proximal development" highlights the importance of social interactions and the learning environment in helping individuals achieve their fullest developmental potential.

About the Authors

Francesco Monterosso Architect/visual designer, researcher/professor, PhD in Design at the Department of Architecture - Palermo, he has dealt with issues about design and cultural heritage, visual communication and ICT. He taking part to national/international researches/conferences, together to scientific coordination and organization of workshops/exhibitions. Member of DRS, SID, ADI and AIAP has been the owner of a communication design studio that has worked for public/private companies and istitutions.