

**DIGITAL
ATELIER AND
THE DESIGN
OF ICT IN
SECONDARY
SCHOOLS**

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ABSTRACT

This chapter introduces the general frame of a Digital Atelier: meaning, methodologies, key aspects. Starting from a dictionary presentation (to investigate words) and from the Italian National Digital School Plan (to find aspects interesting for other European countries) we then present the two approaches we seek inspiration from for project (the pedagogical approach of Alberto Manzi and the design approach of Bruno Munari) in order to imagine, design and test creative Digital Atelier for teenagers.

DIGITAL ATELIER: LET'S START WITH THE DEFINITION

The **APP YOUR SCHOOL** project defined the Digital Atelier starting from the Italian National Digital School Plan (PNSD - Action#7, pag.50), as:

"innovative and modular spaces where to develop the meeting point between manual skills, craftsmanship, creativity and technology. In this vision, technologies have an enabling role but not exclusive: as a sort of "digital carpet" in which, however, imagination and doing meet, combining tradition and the future, recovering practices and innovating them. Educational scenarios built around robotics and educational electronics, logic and computational thinking, manual and digital artifacts, serious play and storytelling will find their natural home in these spaces with a view to building transversal learning."

The Italian National Digital School Plan was the base of our European experimentation.

OUR RESEARCH ON DIGITAL ATELIER STARTED FROM THE DICTIONARY

WHAT DOES DIGITAL MEAN? (TRECCANI ONLINE)

From the Latin *digitalis*, derived from *digitus* 'finger' • before 1575. *imprints; percussion; exploration; numbering*

From the English *digital*, derived from *digit* (from the Latin *digitus* 'finger') 'digit (of a numbering system)' • before 1963. In electronics and computing, it refers, in *contrast to analogue*, to equipment and devices that deal with quantities in numerical form, that is, by converting their values into the numbers of a convenient numbering system (usually binary, or systems derived from it), or are otherwise *numeric*; it also refers to quantities dealt with by these devices, and their representation.

WHAT DOES ATELIER MEAN?

From old French *astelier* 'building site' • before 1843. *"atélié"* s.m., French. [from old French *astelier*, derived from *astelle* "wood chip", which in turn is from the late Latin *astella*, dim. of *astula* variant of *assula* "chip; wooden board"]. Properly, the workplace of artisans; also, study, workshop, above all of artists: *that of a painter, of a sculptor; of restoration; and with extensive use, . photographic.*

The vocabulary suggests some approaches starting from the words:

- **BUILDING SITE:** it is the perfect image of a place where things are in progress. The work has a goal and set time, but we proceed by bringing together the design and reality. Perhaps there is also tolerance for confusion, for disorder, for error. There is room to redo things, if necessary. There is collaboration.
- **WORKPLACE:** in a workplace there are objectives to achieve and real tasks, there are deadlines, roles and skills. There is also work to take home. There is coordination (synchronising efforts and sharing resources), cooperation (acting in a way that aims for a common goal) and co-creation (producing a new result together).
- **CRAFTSMAN**²: it is making art by hand. It is the clever and skilful handiwork. It is contact with material. It is the project that becomes concrete thanks to the industriousness and skill of the hands. It is the analogue world that stops being in contrast with the digital one. They are no longer opposed but complementary.
- **IMPRINTS**³: it is leaving the sign of being there, it is representation of self and abstraction at the same time, in a sign/symbol/code. But it is also knowing how to face the unexpected: impromptu, without being able to prepare, improvising. These are new situations where we need to use what we know and what we can do to orient ourselves in a new situation or task.

1 Original text (ita): "spazi innovativi e modulari dove sviluppare il punto d'incontro tra manualità, artigianato, creatività e tecnologie. In questa visione, le tecnologie hanno un ruolo abilitante ma non esclusivo: come una sorta di "tappeto digitale" in cui, però, la fantasia e il fare si incontrano, coniugando tradizione e futuro, recuperando pratiche ed innovandole. Scenari didattici costruiti attorno a robotica ed elettronica educativa, logica e pensiero computazionale, artefatti manuali e digitali, serious play e storytelling troveranno la loro sede naturale in questi spazi in un'ottica di costruzione di apprendimenti trasversali".

2 [derived from art]. - s. m. (f. -a) (mest.) [who practices a manual art for the production of goods and services] ≈ (lit.) craftsman, (old) Artist. adj. [artisan, made by a craftsman: artisan fair] ≈ and [ARTISANAL (1)]. (Treccani online)

3 Impression, mark, sign, trace, [of steps] imprint.

- **PERCUSSION:** it is a gesture that produces an effect. Among the meanings of the Italian verb “percuotere” we find one that describes what we would like to happen in a Digital Atelier: to provoke a strong emotion in someone, a strong disturbance, an intense feeling, of surprise, wonder.⁴
- **EXPLORATION**⁵: observation is fundamental and must be careful and precise; it is careful seeking, for the purposes of investigation and research, it is careful reconnaissance that opens the door to discovery, to acquiring new information, leaving undefined the limits, which only exploration will define. It is the space in which the analytical and the poetic can meet: observing carefully to understand, but also to imagine, to grasp.
- **NUMBERING:** it is the graphic representation of the numeral system, that is the possibility of giving order to what has been discovered and experienced: in the form of a catalogue, an exhibition, a map... it is a fundamental phase of the Digital Atelier. It is the student who documents their discoveries, who keeps track of their path, who “counts” the variants they discovered, found, came to understand...

IN RELATION WITH OTHER EUROPEAN CONTEXTS (AS IN THE EXAMPLE OF PORTUGAL)

The digital atelier, which concept was first conceived from the Italian National Digital School Plan meets not only the current Italian context but finds its correspondence, as the project has shown, in the contexts of other European countries as for example in the current Portuguese context, both in terms of legislation and in terms of practices developed in a formal and informal environment. In addition to being able to be developed in specific subjects (ICT, Citizenship and Development), they also find their correspondence like within the framework of projects integrated into the citizenship education strategies that each school is creating following the National Citizenship Education Strategy.⁶

These projects, like the ateliers, aim to solve pressing problems in the specific socio-cultural and geographical context, promote collaborative and cooperative work, use diverse and innovative methods and tools, but also innovative ways of using art and technology, to creativity and imagination.

Another correspondence is in the concept of the digital atelier in trying to answer to some problems that schools all over Europe face like student demotivation, problems with school achievement and in the worst case, Early School Leaving. In Portugal, the eagerness of schools and teachers to change their classroom methodologies and find innovative environments that support the growing request of the teacher to face the problems nominated, gave birth to initiatives like the Innovative Educational Environments (Ambientes Educativos Inovadores), also known as future classrooms (Salas de Aula do Futuro, SAF), inspired by the European Schoolnet’s Future Classroom Lab and with the support and promotion of the DGE (the Portuguese Directorate-General for Education). The DGE has organised a number of events, e.g. Pedagogical Days, focusing on new learning spaces and new teaching methodologies within them. Another important initiative is the Learning Laboratories (LA) initiative, also developed by the Directorate-General for Education, in partnership with the European Schoolnet (EUN), which consists of the dissemination of methodologies for curriculum integration of ICTs that have been validated in pilot projects at European level. Through the LA initiative, the DGE provides a set of tools, guidelines and resources to support schools in the design, adaptation and implementation of innovative teaching and learning scenarios.

This initiative provides an opportunity for schools to assert themselves, among others, as spaces for innovation, catalysts for collaborative work, the development of creativity, autonomy and critical thinking.⁷

It is within this framework, that could be representative at European level, that the digital atelier finds a correlation as a modular and easily transferable “place” that opens the way to new ways of meaningful learning, active, informed and responsible participation, innovation and pedagogical creativity in order to respond in an inclusive logic to all students and in the commitment of fighting Early School Leaving.

⁴ www.treccani.it/vocabolario/percuotere/

⁵ From Latin *exploratio -onis*, derived from *explorare* ‘observe, investigate’ •15th C.

⁶ Monteiro, R., Ucha, L., Alvarez, T., Milagre, C., Neves, M., Silva, M., Prazeres, V., Diniz, F., Vieira, C., Gonçalves, L., Araújo, H., Santos, S. e Macedo, E. (2017). *Estratégica Nacional de Educação para a Cidadania*. Lisboa: Ministério da Educação. www.dge.mec.pt/sites/default/files/ECidadania/Docs_referencia/estrategia_cidadania_original.pdf

⁷ See: erte.dge.mec.pt/laboratorios-de-aprendizagem

HOW CAN A DIGITAL ATELIER BE DESIGNED AND REALIZED IN PRACTICE?

The shape of the “Digital Atelier” in the **APP YOUR SCHOOL** project is an important and strategic innovation. In a Digital Atelier there must be a meeting between:

- **ANALOGUE/DIGITAL**
The analogue represents a wonderful opportunity to slow down the digital and let the child have a new, meaningful experience which can sink in.
- **USELESS/USEFUL**
For “useless” we suggest the space where our personal inner “anchors” are possible, those that help us give meaning to things and to ourselves.
- **MAKING/UNDOING**
It is the necessity of moving the body and hands in order to imagine, ask questions, produce hypotheses and verify them.
- **INDIVIDUAL/COLLECTIVE**
The continuous dialogue between I and we, between taking charge of oneself and collective responsibility.
- **POETIC/ANALYTICAL**
The poetic and divergent gaze can allow more in-depth analysis, as well as careful analysis which is open to new and unpredictable views of the world.
- **ARTISTIC/SCIENTIFIC**
These languages and tools, which the child will later discover as disciplines, are in dialogue with each other to provide experiences that lead to discovery and wonder.

Following further the guidelines of the Italian NDSP we can highlight some key concepts that are essential to understand the methodological frame applied in the Digital Atelier.

“Education in the digital age should not focus on technology, but on new models of educational interaction that use it”

We started with the presupposition that we could reread the pedagogical, design, artistic and technological approaches of Alberto Manzi and Bruno Munari, to better understand what to do and how. We could therefore experiment with new things, starting from “old questions”, with the advantage of working in an area that teachers would find familiar and stimulating. We started not from technology, but from teaching. We banked on the fact that students would willingly spend time discovering the technical uses of new software or apps in their free time, or creating quick tutorials of things they could do well (for example in Minecraft), without feeling the need for the teacher to become the workshop technician, an expert in each new technological offering. We ask the teacher to be curious about what can be done with technology, to look for interesting inspirations within their passions to facilitate personal research; we asked the students to make their desire to “fiddle around” with technology available to their Digital Atelier. Of course: they haven’t all done it, nor done it all the time. But in class there was always someone who could act as a mentor to others, who enjoyed discovering “how it worked” and felt gratified to be available to the class, the expert who solved the most complex issues.

“In this paradigm, students must be knowledgeable users of digital environments and tools, but also producers, creators, designers”

In a Digital Atelier it is creative thinking and imagination that guide exploration, structuring the cues for critical thinking. To do, I need to think, I need to know. If we talk about making our students into:

- **DESIGNERS:** then we must work primarily, as adults, on the method, not to restrict questions and procedures – as is often the case – but to help students and other teachers find their own path, while indicating some necessary steps;

- **CREATORS:** inventing is difficult, imagining is necessary. Creativity, fantasy and imagination play a fundamental role in the atelier and are not incompatible with mathematical/scientific thought. Making predictions, imagining what can happen, visually exploring variations and phenomena allows us to gather knowledge and information from which something new can then be created. We can find answers to scientific questions using technology in a divergent way: how can we explore the seabed? How can we see what animals see? “Creativity, for Manzi, is being able to face and overcome concrete problems”: “it means helping an individual defend themselves from the laziness that could arise from using ever more perfect machines; getting used to living, always remaining masters of your own critical senses”⁸;
- **PRODUCERS:** space for doing things for real is fundamental, simulation is not enough; “let’s do it”. Getting to the final product gives the student and class satisfaction, should allow positive reflection, and marks an achieved goal after which it is possible to do even better. Therefore there can not be a disconnect between the process and the product: when we work, many products are produced, if there are plenty of hands at work. It is the visual catalogues that trace graphic experimentation, the posters that show the point of what has been learnt, the tutorial that helps other classmates work better.

“And on the teachers’ side, in particular with regards to digital skills, they will have to create the right conditions to act as facilitators of innovative didactic paths based on content that is more familiar to their students”.

The teacher is the designer and the researcher: they know how to combine interesting stimuli and how to manage a class in an atelier. It is usually a quiet and focused class, but also chaotic because each gets to choose their own material, experiment with their own ideas, within the research framework set with the teacher. And the teacher is fully within their role: they may lack a few technical skills for using Aurasma, for example, but they cannot help wondering where the desire to augment reality comes from? And what does it mean to “augment it”, or its opposite, to “diminish it”? How many ways has humankind found to do it? What is the difference between augmented and virtual? We could discover that “narrative fiction is an archaic virtual reality technology specialising in the simulation of human problems” because in stories we could take advantage of the “simulated” experience⁹. Here then the Digital Atelier becomes a privileged space to examine the world by making the most of the technology available. Creativity and curiosity (firstly from the teacher) will play the most important role, not technical ability.

“Strengthening the school’s digital infrastructure with “light”, sustainable and inclusive solutions”

“Workshops must be reconceived as places of innovation and creativity, rather than mere containers for technology”

The Digital Ateliers we have tried so far are at a “low technological threshold”: just a tablet connected to the interactive whiteboard, for example. It seemed more interesting to us to design activities that would engage analogue and digital in dialogue, to do artistic and technical work. This is why it has never needed too much equipment. Students have even been guided to use their mobile phone or tablet in¹⁰ a collective creative journey: this allows teachers who do not want to face difficult technical problems to spend more time exploring and researching.

“Turning school workshops into places for the meeting between knowledge and know-how, putting innovation at the centre”

Talking about innovation is always complicated. What is new, and who for?

“The school system, as Jerome Bruner reminds us, gives too much importance to learning what is already known, and too little to finding that which is not known. But how do you teach a student the technique of discovery?”¹¹

The following is the path we have followed in proposing Digital Ateliers.

APP YOUR SCHOOL – FROM CONSUMPTION TO INVENTION

Switching from the consumption of technology / to “doing research” with technology / inventing new things and new technologies

1. Passion / consumption / understanding how it works / phase: instruction booklet
2. Teacher’s intervention / to get away from the stereotypical and banal, and ask the student questions / use / the theme of the design / guided experimentation is born
3. Hands-on activity / guided experimentation / inventing / opportunity for personal invention, designing something new

The new is therefore not new in an absolute sense, but new to the student, sufficiently divergent from a consumerist use to open up a space for creation and imagination. The teacher’s personal research is fundamental: our ideas have come from digital art as well as from scientific subjects, from contemporary art exhibitions to historical/literary subjects. The teacher’s curiosity, their imagination in integrating the things they experience, discover and know, is fundamental. A Digital Atelier first exists in the mind of a creative teacher, who is not afraid to tell their students, “I don’t know how to do this, let’s find out together”, “if we get it wrong, let’s try again: let’s make a note of all the mistakes”.

Trusting students can be one way to go, while also preparing a back-up plan and an emergency stop, but with technology we know we can count on their curiosity: “The school should go back to entrusting things to the students: the pleasure of looking for what is hidden, the need to wait, work on it, sniff it out, see it become something that was not there before”¹².

“Technology has a role that is enabling but not exclusive: as a sort of “digital carpet” where, however, imagination and doing come together, combining tradition and the future, taking established practices and innovating them”

The adjective “enabling” is fundamental: to make able, to provide an opportunity for skill, or to become competent, to feel suitable, “ingenious”. This can arise from the constant clash between what you know and what you don’t know, between what you know how to do and what you can’t do yet. In this drive for self-improvement, most keenly desired by the student as a personal challenge, the school gets every student on board. “Not one less” is all here: knowing how to challenge them confidently, like a good video game would: “try again” “good play”.

“Switching from “transmissive” teaching to active teaching”

In Digital Ateliers, but also even earlier in Alberto Manzi’s classes, the traditional lecture did not exist. The questions were to guide the class’ research; the children’s experiences were explored to extrapolate sufficient research data; it was through continuous interaction, through speaking, imagining, making and undoing, that the class discovered the world. The disciplines were the tools needed to do it, not the end. This approach has shaped the Digital Atelier: a question has prompted every phase of the work, activated the students’ knowledge and experience. Technology has let us give work form and visibility; it was a tool for observing and a tool to be observed.

“Rethinking the school as an educational interface open to its environment, inside and beyond the school buildings”

The gaze towards the area and the surrounding environment was a further and necessary guideline we gave ourselves in the Digital Ateliers: developing QR code for the public library, organising a local exhibition, preparing an installation, making posters to involve other students and not just classmates, getting involved with environmental causes or historical heritage; discovering and going out in the neighbourhood; these were some of the strategies implemented to make students feel part of their local community.

The school has recovered its role as a cultural entity in its local area, which in conjunction with other institutions takes care of: “cultivating and at the same time tempering the imagination, so that students are able, as they grow, to examine the new rather than becoming accustomed to it, and so that now and in the years to come, they will know how to make independent ‘smart’ choices in the vast world of cultural opportunities they find outside school.”¹³

“To ensure that, in the digital age, the school becomes the most powerful multiplier of innovation and change in the country.”

⁸ A. Manzi, *Education... but what is it?*, original script archived at the Alberto Manzi Centre.

⁹ J. Gottschall, *The Instinct to Narrate – how stories made us human*, Bollati Boringhieri, p.75, Turin, 2018

¹⁰ The digital school, in collaboration with families and local authorities, must open up to so-called BYOD (Bring Your Own Device), i.e. policies where the use of personal electronic devices during educational activities is possible and efficiently integrated.

¹¹ Jerome Bruner, *Knowing. Essays for the left hand. – Learning by discovery*, 1962

¹² Andrea Bajani, *Teaching life with a bean, school and wonder*

¹³ Ibid., p.135

TECHNOLOGY AT SCHOOL

It remains a problem. Generations of teachers “forced” to integrate tools that they do not like, or which do not interest them, are hardly able to design courses which can put their students’ skills and passions to the test.

Of course, the situation cannot be generalized: there are male teachers and female teachers, secondary school teachers who have already integrated the technology in school every day thanks to personal training, the exchange of practices with colleagues, and their personal interests.

To facilitate access to technology for all students, we need to find a way to bring teachers closer to methods and projects that can open up the way to new interests. It is not the teachers who have to move towards technology (this does not seem to have worked, at least not completely), but it is technology that must find a way to make itself appealing to teachers.

We wanted to see what we could learn about using technology in a divergent and creative way, how to make tools which would help students explore the world and express themselves, and experience the poetic, the amazing, the wonderful.

We knew that if we found something along that path then even the teachers would be happy to explore it, because school is a great place to discover the world and oneself: technology is directly connected to life.

“To create fabulous little worlds for everyday use”¹⁴ that arise from an “imaginative technological dissatisfaction”: even before designing, we must give space for teachers and educators’ imagination and creativity, in order to challenge a consumerist use of technology and imagine instead another life thanks to the power of the disciplines, their rigour, to new levels of understanding reality.

The experiments carried out with the Appyourschool project have brought out the need to:

- **EXPLORE THE POSSIBILITIES:** always be open to the many possible ways of doing and thinking, so that everyone is encouraged to give of their best; make it possible to discover a thing’s many aspects so as to avoid simplifying or restricting it by knowing only one aspect; make sure that it is possible and desirable to change one’s opinions when they come into contact with better ones;
- **LET HUMOUR AND PLAY ENTER INTO IT:** playing is a serious matter, calling upon all our senses and our attention and directing them towards an end; self-motivation born from the pleasure of doing something can take students a long way;
- **TACKLE THE PROBLEM OF CREATING:** “it is not the object that should be preserved but the way, the design method, the modifiable experience ready to make something again”¹⁵
- **TRANSLATING THE DISORDER OF REALITY INTO ORDER:** technology has supported the school disciplines involved in translating the richness, variability and disorder of the surrounding environment, bringing into being a provisional order that could enhance the skills, creativity and imagination of the students themselves. We wanted the students to become designers of new uses and technological projects by employing their curiosity for technology to rethink, to some extent, the nature of school. For its part, the school has the obligation to teach children to be able to look carefully, to cultivate doubt, to question habits, to break stereotypes, to understand - but also to overcome - the rules.
- **TECHNOLOGY AS A TOOL THAT IS EXPRESSIVE, CONCEPTUAL AND CAN OVERTURN SEMANTICS,** in the hands of students and teachers who both in a group and individually give the best of themselves in order to produce something functional and useful to the community, even if only in the sense of new and broadened knowledge. “Help others to participate in creativity, spread the methods and techniques of building messages, spread the learning done by everyone for everyone. Everyone has something to say, to stimulate individual creativity to promote collective growth”¹⁶.
- **THE MEDIUM IS THE SAME FOR EVERYONE:** what makes the difference is the creative experience the students have thanks to the school, a place where technology is not taken as is, but is investigated, opened up, used and “manipulated”, away from the usual and the ordinary, to open up new expressive and creative opportunities for all students.

¹⁴ A. Tanchis, *The Abnormal Art of Bruno Munari*, Universale Laterza, 1981, p.13

¹⁵ B. Munari, *Fantasia*, Laterza, Rome-Bari, 1977, p.144

¹⁶ B. Munari, Introduction by Bruno Munari, 1975

Bruno Munari experimented with the photocopier, typographic screens, slides¹⁷, typewriters, films and photography. His artistic career can stimulate new teachers and students, who see him as an excellent example for developing a divergent and creative way of seeing and doing.

In his Manifesto of mechanisation of 1952, Munari calls upon artists (and we do the same by calling upon teachers) to “get to know the machines and distract them by making them work irregularly” by forcing the machine/technology “into a gesture that is unique, anti-economic, artistic, to create a new poetic, magical, artistic society”¹⁸.

Beppe Finessi, architect and professor at the Politecnico di Milano, tells us: “... like that time in the Xerox store, in Milan, the early sixties. “Please, Mr. Munari, do not move the original, otherwise the Xerography will come out bad”. Exactly. Here the use of the forbidden becomes the norm. A machine created to reproduce an original in an unlimited number of copies can instead produce originals, different from one another. [...] All this simply by breaking a rule. Original Xerography, a perfect oxymoron.”

“Munari targets the whole series of prohibitions relating to the photocopier’s use: the instructions not to move the original, or keep the lid open, or place objects on the ‘plate’”, performing a systematic betrayal of the instruction booklet.¹⁹

What should never happen during its operation?²⁰

What are the photocopier’s limits? Or those of a tablet? Or a smartphone? And if these technologies could go wrong?

Testing objects’ limits, the limits of their actions necessary to discover new unexplored territories “in the sense that almost nobody fully exploits the possibilities offered by the world of things, and is limited to a standard, average and often mediocre use”²¹.

¹⁷ “With the typewriter you can also write poetry, of course it will be necessary first to train the machine, accustomed to writing words that are too frivolous, such as: posting, packaging, receipt, reference, tot, quid and stamps included. From time to time, between one invoice and another, take a blank sheet and type: algae, doves, silence, heron, echo, wind, childhood”, B. Munari, *Proposal by Munari*, 1950, p.7 on the possibility of derailing machines.

¹⁸ Various authors, *Art in Italy after World War II*, Il Mulino, Bologna, 1979, p.75

¹⁹ M.Sammicheli, G. Rubino, *Munari Politecnico*, Nomos Edizioni,

²⁰ Various authors, Bruno Munari, *Like that time*, Beppe Finessi, p. 39/42, Mazzota, Reggio Emilia, 2000

²¹ Various authors, Bruno Munari, *Freedom is the limit. Munari, the art, the method*. Marco Meneguzzo, p. 25/29, Mazzota, Reggio Emilia, 2000



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