

Authentic Learning, Creativity and Collaborative Digital Storytelling: Lessons from a Large-Scale Case-Study

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ABSTRACT: PoliCultura is a collaborative digital storytelling program for schools (K-12), which has gathered so far more than 41,000 students. It is an example of authentic learning experience, for a number of reasons, including the fact that students are required to do a “professional” work that will be made public in the frame of a competition. The paper investigates whether PoliCultura can foster creativity, by analyzing all the “stories” submitted to the competition in 2020 using a literature-based creativity rubric, with positive results. The analysis of the teachers’ pedagogical reports sheds light on the key factors for promoting creativity, which are, for the teachers: to be a facilitator of the activity, to promote collaboration, to “open up” to external support and stimuli beyond the classroom and to foster the students’ individual talents. Guidelines for designers of educational tools are drawn too: provide a clear path while at the same time allowing a wide degree of freedom, keep the threshold low and plan for the teacher to be at the center-stage.

Keywords: Authentic learning, Creativity, Digital storytelling

1. Introduction

To argument in favor of why creativity should be “taught” at school is not necessary. It has been claimed far and wide, in connection to our “VUCA” world (characterized by Volatility, Uncertainty, Complexity, and Ambiguity) that seems to require, more than ever in history, the capability to adapt, solve problems and find solutions that are “Novel, Effective and Whole”: “the emphasis on creativity has never been as pressing, or as academically discussed, as it is in present day” (Mishra et al., 2013, p. 10); in the same line Ohler (2013, p. 13) says that “success in the digital age, both personal and professional, lies in understanding that digital technologies provide one of the greatest imagination creativity amplifiers humankind has ever designed.” Similarly, to argument in favor of authentic learning as a trigger for creativity is “not so” necessary, though further evidence may be welcome (Davies et al., 2013; Jindal-Snape et al., 2013). *What we are in need of are ways to foster creativity in our students:* ways to “teach” how to be creative, guidelines to design educational experiences (and tools) that put creativity at center stage. As Henriksen et al. (2015, p. 458) say: “along with this shift toward increased creativity in the classroom comes a need for student project work and class assignments that emphasize creativity.” In other words: we know creativity is important, we know authenticity can trigger it: but how can we teach this in our classrooms?

In order to answer this question, the study presented in this paper takes an unusual approach: instead of setting up an experiment, it is based on an *in vivo* study of a whole “living creature”: PoliCultura, a program by HOC-LAB at Politecnico di Milano (Italy), that involves groups of students (from K to 12) into collaborative Digital Storytelling (DST). Launched in 2006, PoliCultura is one of the largest deployments of collaborative DST at school in the world: it has involved, so far, more than 43,000 students and 3,200 teachers from 18 countries. The study concludes that PoliCultura is an example of authentic learning activity, fostering creativity, and identifies some key triggering elements that can be taken into considerations by instructors and designers wishing to pursue a similar impact.

After a literature review on creativity, authentic learning and DST in education, the paper describes the case-study and the method of investigation. The results of the interpretation of the program in the light of the authentic learning paradigm, on one side, and creativity, on the other, will lead to the conclusions, in which guidelines for teachers and designers of tech-based educational experiences are drawn.

2. Literature review

The three elements (“Authentic learning,” “Creativity” and “Digital Storytelling”) this paper intertwines are dealt with in the literature in thousands of books and papers. In what follows, the essentials for each are presented, in relation to this study’s focus.

2.1. Creativity and education

Creativity has been identified as a key competence to learning (Kereluik et al., 2013). The standard definition of creativity was developed in the field of psychology (Stein, 1953) as requiring two elements: novelty and utility. This definition is echoed by Robinson (2006), in his TED-talk “Do schools kill creativity?” where he defines creativity as “the process of having original ideas that have value” and underlines the need to “be prepared to be wrong” if you want to “come up with something original.” In the same line, Mishra et al. (2013) define creativity as something “Novel” (bringing something into the world that was not there before), “Effective” (useful) and “Whole” (bound to the context within which it occurs): something “NEW.”

Creativity in education is seen as something we should not “squander” (again, Robinson, 2006): everyone is potentially creative (Ma et al., 2018) but the school environment in which they are educated influences whether they can develop this potential or not (Giroux & Schmidt, 2004; Nickerson, 2010).

Other scholars focus on what to do (or not) to “teach” creativity. Torrance (1987) identifies 9 ways to teach kids how to think creatively, among which the most relevant for the present case are “creative arts as vehicles” and “motivation, reward, competition,” as it will be discussed later. Amabile et al. (1996), as reported in Wadaani (2015, p. 676) “believe that creativity can be encouraged through factors that promote intrinsic motivation with a positive sense of challenge and a focus on the work itself. Such important factors of creativity development [...] include autonomy space, creativity encouragement, commitments with clear goals, mutual openness to ideas, and constructive challenge with appropriate reactions and feedback.” Wadaani (2015) says that teaching for creativity is not a method but rather a “philosophy” and that teachers “can practice some teaching styles to create an environment of creativity that strengthens the teaching methods that they typically use” (p. 675). Morris (2018) notices how creative learning outcomes are correlated with teachers leaving control to the learners.

A strong relation has been identified between creativity and the infusion of technology into the classroom. As Henriksen et al. (2021, pp. 1, 2) point out, “this rising interest in creativity has occurred during a period of significant societal change due to rapid shifts and developments in technology. Technologies are altering how humans think, work, live, play and create faster than ever. It is, therefore, no surprise that this interest in digital technologies has emerged alongside creativity as critical to contemporary education.” The same authors complain that “despite the development of educational policy about creativity, and research into technologies and practices aligned with creativity, instantiating these into the realities of classrooms remains a significant challenge.” There is work acknowledging the intersection between these realms (e.g., Sullivan, 2017 or Mehta et al., 2019), but still lacking in the examination of “the creativity-technology relationship from within the classroom, [...] *in situ*,” while “most of the research in the nexus of creativity, technology and education is conducted from [...] outside the experiences of practitioners” (again Henriksen et al., 2021, p. 14, to which the reader is referred for a comprehensive review on this topic).

2.2. Authentic learning

Connecting classroom learning with the outside world is the central point of a great variety of teaching approaches that can be considered declinations of what is more generally defined as “authentic learning.” According to Herrington et al. (2014), authentic learning is not a theory of learning, but a guideline to be considered when designing the curriculum. The idea is that students learn more effectively and feel more motivated if they are placed in a context that reflects real life, in contact with relevant issues and achievable projects. In authentic learning, students learn by doing and acquire skills that will be useful in their professional life, like critical thinking, problem solving and research methods. Authentic learning puts students at the center of the stage (Reeves et al., 2002). Students are faced with as-much-as possible realistic problems where the solution is not obvious nor pre-defined and have to take action in order to solve them. Authentic learning highly enhances students’ agency due to the strong link with the real world. It tries to amend what Graham (2003) in a quite insightful blog post, complains about: the lack of perception of relevance by students about what is taught them. Authentic learning has sometimes been associated to DST educational activities, especially in the frame of pre-service teachers training (e.g., Chung, 2021; Heo, 2011; Sadik, 2008), where “authenticity” refers mainly to their professional future use in the classroom.

2.3 Digital Storytelling in education

2.3.1. The origins

DST is a practice born in the late 90s in California at a Center first located in San Francisco then moved to Berkeley and named “Story Center” (www.storycenter.org). The Berkeley center offers workshops to empower personal storytelling (“life stories”) through multimedia (<https://www.storycenter.org/history>). Since then, DST has experienced a huge success in various fields, like for example cultural heritage or corporate communication, and especially in education.

One of the first examples of educational usage of DST is reported by Mellon (1999), who asked college students to develop a story about a person in their family who had had an impact on their life and acknowledged the motivation the activity raised. This experience was in line with the original DST “philosophy” that puts self-expression at the center of the stage (Burgess, 2006; Meadows, 2003). In 2005 Robin and Pierson, scholars at the University of Houston (home to an important center for DST), matched a digital photography course to a storytelling course, again noticing how the activity was capable of enhancing the students’ motivation. In a many-times re-edited book, Lambert and Hesslers (2018) explain the “7 steps” for creating a digital story, thus forging a tool for educators to embed digital storytelling in the classroom. Again Robin (2007) sketched educational experiences in which students would receive assignments that would first require them to carry out research on a topic and then to choose a particular point of view under which to describe it. He underlines how this process can capitalize on the students’ creative talent that is expressed when they are asked to do research (learning how to use libraries and the internet to find rich and deep content), to analyze it and synthesize it and finally tell their own version of the story (Robin, 2016). Again, the emphasis is on the personal point of view. This trend, which characterized the origin of DST, reaches to our days: for example, Kim and Li (2021, p. 33), while describing an experience with DST in middle-school, pinpoint “how students expressed their voices, identities, and emotions using the multimodal resources available in digital stories.” It must be noted, though, that storytelling has broadened its scope, from sheer self-expression to other themes. Robin himself (2008, p. 224) points out how digital storytelling can obtain excellent educational results when proposed to create, for example, historical documentaries.

2.3.2. Individual vs. collaborative digital storytelling

The emphasis on a personal point of view brings about that, most of the times, stories are done by individual students rather than by groups, even if peer-to-peer sharing is praised as an occasion to introduce a collaborative component in the activity (again, Robin, 2007). Similarly, Gresham (2014, p. 52) implements a creative writing activity where each student is asked to write her/his own story, and notes how collaboration emerges as a relevant aspect: “in time the boys began to see collaboration as something beyond working together and sought inspiration from each other. [...] They found themselves sharing ideas on the topic beyond the structure of the classroom, which indicated that they were engaged in their creative writing.” Examples of collaborative DST, where students are co-creators of a “story,” can be found in the field of Human-Computer-Interaction and outside the scope of formal education, mostly involving young children (preschoolers/first graders) typically playing with “objects” that help making up the story, rather than writing a full script (see Di Blas et al., 2012, for a comprehensive review). As far as formal education goes, collaborative digital storytelling has been explored as a strategy to enhance the learning of a new language, especially English (Nguyen et al., 2020; Nishioka, 2016; Hwang et al., 2016; Chao & Hung, 2014; Hafner & Miller, 2011), or as a playful way to encourage literacy at primary school level (Del-Moral-Pérez et al., 2019). Still, be it for the focus of DST (self-expression) or the nature of collaborative technologies (“most tools, environments and interfaces for co-located collaboration are designed to support the interaction of small groups,” Di Blas et al., 2012, p. 271), the diffusion of collaborative DST is limited.

2.3.3. Educational benefits

Digital storytelling has been connected to benefits of various kinds: self-expression, communication skills, media literacy and – quite expectedly – creativity (Di Blas & Ferrari, 2014; Gresham, 2014; Nordmark & Milrad, 2012; Ohler, 2013; Schmoelz, 2018). There is a general consensus on the relation between DST and creativity; the very task at stake hints at this skill: students are asked to produce something original, something they call their own; moreover, as Robin (2016) points out, all the activities “tap into other creative talents such as creating [the students’] own visual images, taking photographs for their stories and adding colors, transitions and recorded narration” (p. 20).

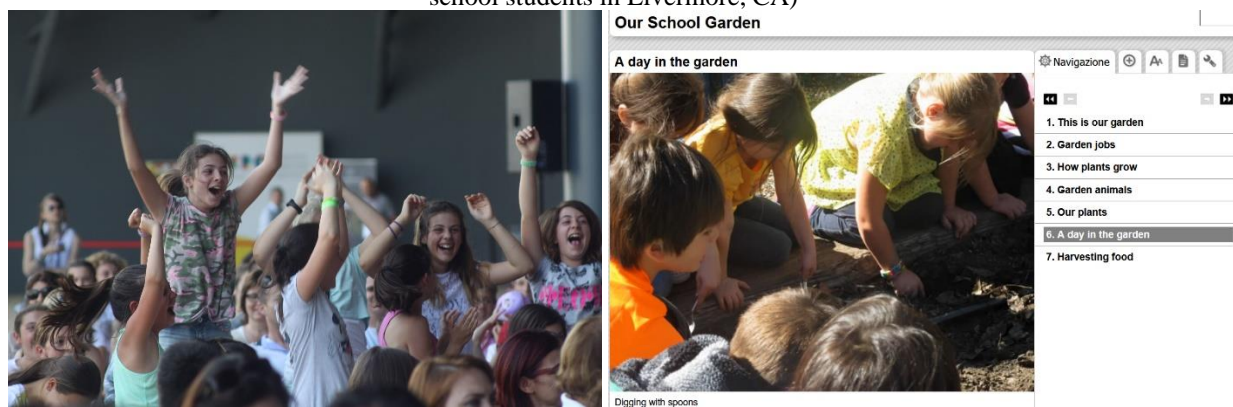
This paper presents an educational experience that lies at the crossroad of creativity, authenticity and DST. In line with the literature, it fosters creativity “through factors that promote intrinsic motivation with a positive sense of challenge and a focus on the work itself” (Amabile et al., 1996, p. 1161). The flavor of authenticity is mainly provided by the fact that the final “product” is submitted to a competition and made public. As regards the approach to DST, PoliCultura is one of the few examples of large-scale programs of collaborative DST, where a whole group of students is asked to create a story together. The main contribution of the study is that, as advocated in the literature, it “gives voice to practitioners” and draws guidelines on how to design authentic, creativity-triggering educational experiences.

3. The case-study

PoliCultura is a collaborative digital storytelling competition designed and run since 2006 by HOC-LAB, a laboratory in the Department of Electronics, Information and Bioengineering at Politecnico di Milano (the largest technical university in Italy). How does the program work? A call is launched at the beginning of the school year, in October. Groups of students, under the guidance of one or more teachers, can take part. All levels, from K to 12, are welcome. Teachers sign up for their teams and are given access to an authoring tool (called “1001stories”) with which to create the digital story and to a Massive Online Open Course (MOOC) on digital storytelling in education (for the teachers only). Scardamalia and Bereiter (2006, p. 115) definition of a “knowledge building technology” perfectly fits the 1001stories tool: “a knowledge building technology should facilitate using information, as distinct from learning it. Obtaining, recording, and storing information would become subsidiary functions, designed to serve purposes of knowledge creation.” 1001stories is a sophisticated technology in itself, but almost transparent for the user, with a very low threshold of technical knowledge required (Resnick & Robinson, 2017): it is like a pencil, with which anything can be written.

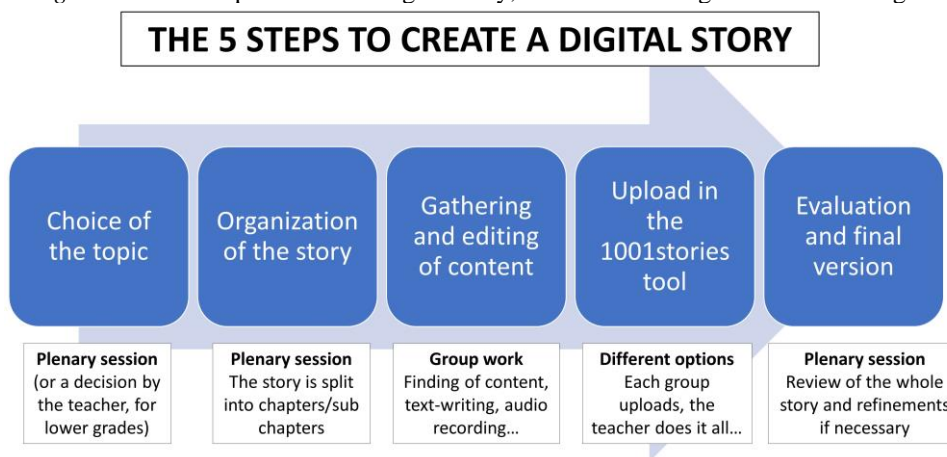
Teams have time from October to March to complete their work and submit it to the competition: the average completion time is a month. It is difficult to estimate how much time is needed to create the digital story, since a lot depends on the choices the team makes concerning the various parts of the work. Based on the feedback by teachers, 20 hours seem to be the minimum. At the end of the work, teachers are asked to submit a report on the pedagogical experience, describing its rationale (see Appendix 4). Once the “story” is submitted, three rounds of jury take place in order to decide who the winners are. At the end, an awards’ ceremony takes place at the university’s premises, during which the winners are unveiled (Figure 1): the ceremony is attended by almost 300 participants and followed in streaming by thousands of people. All the works are made public in the competition’s website (www.policultura.it).

Figures 1. The awards’ ceremony, on the left, and on the right a digital story done with 1001stories (by pre-school students in Livermore, CA)



Teachers are provided with instructions on how to create a digital story, which are reinforced during the MOOC: they are quite loose, to allow maximum freedom of expression and for placing the teacher at the center-stage of the process, as orchestrator of the activity. 5 basic steps are suggested (Figure 2).

Figure 2. The 5 steps to create a digital story, with the main organizational strategies.



- **Choice of the topic**
Teams can tackle whatever topic they prefer, interpreting the term “story” in a quite broad sense (in line with the literature: see Robin, 2008). Over the years, “stories” about any possible topic, ranging from local cultural heritage to school subjects (such as physics, geography, math...) or school outings have been created. In any case, the teacher makes sure the activity is connected to the curriculum and/or the competences the school is bound to foster.
- **Organization of the story**
The topic is organized into chapters and (not mandatorily) sub-chapters. This usually goes with splitting the team into small groups, each in charge of part of the story.
- **Content: research and production**
Students look for the content they need, doing “traditional” desktop research but also going beyond the school’s boundaries involving experts, families and others (Di Blas & Paolini, 2013a). They edit the material in various ways: they write scripts so that they are appropriate for orality (e.g., making sure to repeat some concepts) and an interactive access (i.e., making sure each piece of the story is reasonably independent), they edit videos and images, record audios, select the proper music, decide on the interface labels, etc. This is a phase in which other technological tools, apart from the 1001stories authoring tool, are used: video and image editing apps, for example. In some cases, teams use a cloud environment for sharing the content and thus facilitating the group work.
- **Upload in the authoring tool**
All the materials prepared in phase 3 are uploaded in the 1001stories authoring tool.
- **Evaluation and final version**
The output of phase 4 is critically analyzed, in a plenary session: amendments and redesign are put into place to create the final version.

All the above phases undergo different “interpretations” according to the school level (e.g., the decision on what topic to deal with is usually taken by the teacher at level K up to levels 4-5) and also to what benefits the teacher is after (e.g., if she is after cognitive benefits, she will focus on phase 3 and especially on desktop research; if she is after technical benefits, she will equip the students with the content and focus on the technical tasks – phases 3 and 4 – instead). It is highly unlikely for a team to go in depth into all phases and gain all possible benefits in full (Di Blas & Ferrari, 2014). Benefits range from the “traditional” ones (e.g., cognitive benefits related to a better understanding of the topic dealt with) to competences (communication skills, media literacy skills...) and less traditional skills (e.g., professional skills, like “understanding what a deadline is”). Among the benefits there is creativity, which is the focus of this study.

4. Method of the study

As mentioned in the introduction, this study aims at answering the question “how can educational experiences that put creativity at center stage be designed?” and in order to do so it tries to elicit from a “living organism”

like PoliCultura the key elements and triggering factors that make it an authentic and creativity-oriented educational experience. The very first steps therefore are interpreting PoliCultura's main features through the lens of the "authentic learning" paradigm (Reeves et al., 2002) and then investigating whether creativity is actually fostered by the activity; the third step consists in the analysis of the teachers' pedagogical reports, to identify what the recurring elements that characterize the experience are.

Creativity is something that can be perceived, but is quite difficult to assess. In previous years, participants were asked to self-assess their improvement, but the results were positive to the point of raising suspicion: only top scores were given, probably due to the satisfaction of having completed a challenging task. So, it was decided to switch "from the producers to the product," as suggested by Henriksen et al. (2015), and to use an adapted version of their rubric that revolves around the three attributes of "Novel," "Effective" and "Whole" (see Appendix 1).

In June 2020, 58 "stories" by teams of 20-25 students each (1,160-1,450 students on the whole) were submitted to the competition. They were analyzed, independently, by three reviewers with years-long experience with DST in education and who have been part of the referees' board of the competition since 2006. In order to ensure inter-reliability of evaluation, a number of collaborative sessions among them were held, to compare the scoring "style," fine-tune the use of the rubric and set a common standard. Reviewers independently scored the digital stories on a Likert scale from 1 to 5, where 5 was the most positive value. Hereafter, the definitions for the lowest and top scores are reported.

- **Novel:**
 - Lowest score (1): Complete lack of anything unique or novel, lack of content and substance to offer opportunities for novelty (e.g., a standard story, copying existing models).
 - Top score (5): Strong qualities of uniqueness and exciting or interesting to viewers. Is very novel or different from other examples (i.e., other digital stories previously submitted to the competition).
- **Effective:**
 - Lowest score (1): Complete lack of pedagogical effectiveness, and lack of content or substance. A confusing approach, or highly limited presentation of subject that does not make up a coherent picture (e.g., where the contributions by the different groups to the final work are not harmonized).
 - Top score (5): Excellent and highly effective pedagogical approach to communicating the subject. Makes the subject matter clear and comprehensible to most viewers and presents it in interesting and engaging ways that make the subject come alive.
- **Whole:**
 - Lowest score (1): Little or no aesthetic qualities. Poor, or complete lack of, production values, and indicates little or no thought to the design of the learning experience.
 - Top score (5): Excellent or exceptional aesthetic qualities. Flawless or near-perfect production values. Approach provides rich sensory interest (visual, auditory, etc.) for viewers, and all aspects of the design of the digital story are well thought-out to provide an aesthetically cohesive, or "whole" vision that is exciting, thoughtful and stimulating to viewers.

Furthermore, the reports by the teachers were also analyzed in order to identify the most typical aspects that characterize the experiences. The reports follow a schema (see Appendix 4) with some fields to be filled (with no words' limits): their length spans from 1,500 to 2,000 words. They were manually (reporting the data on Excel files) tagged, looking for evidences of: the teacher's role as facilitator, the relevance of group work, the enhancement of the students' specific talents (over having all the students perform all the tasks, regardless of their preferences), the influence of "external resources" and of the spur provided by the visibility of the competition. No score was given to these factors, only their *substantial* (i.e., quite prominent and playing a significant role) presence was reported (1 = present; 0 = absent).

5. Results

5.1. PoliCultura as an authentic learning experience

First of all, let us see if PoliCultura can be labelled an "authentic learning" experience, following the "authentic learning" paradigm (Reeves et al., 2002). Authentic learning experiences are meant to match, as much as possible, real world experiences, in order to foster motivation in the students. First of all, they mimic a professional, all-round approach (different with respect to decontextualized classroom experiences), in which the path that leads to the final result, which is usually a product valuable in its own right, is ill-defined, leaving to the

students the burden of defining task and sub-tasks. This is exactly what happens in PoliCultura, where students are given the task of creating a multimedia communication artifact taking care of all the aspects of its production, as if it were a professional task. Guidelines are offered but they are quite loose, so that they give vent to the most diverse interpretations. This makes the possible outcomes “multiple” in form, style, content... which is another key component of an authentic learning experience. The completion time is quite long (spanning days/weeks and in some cases even months) and requires students to collaborate: again, this is in line with the authentic learning paradigm, which differentiates traditional assignments, which may require a few working hours and are carried on individually, with respect to authentic, professional-like tasks, which are carried on in a team over a long span of time. In the stories produced by the students, the issue at stake is always relevant for the curriculum or the school-life in a broad sense (as the reader can appreciate, by reading the titles and short descriptions in Appendix 3): it requires students to scavenge sources to find the “raw” content (websites, books and articles, experts...) and therefore it pushes them to examine a topic from different perspectives and separate relevant and non-relevant information. The activity is interdisciplinary, being managed most of the times by two or more teachers of different subjects. There is no official assessment: surprisingly enough, most of the teachers don’t score their students for their participation in the activity, probably due to the fact that they would not really know how to nor how to isolate specific aspects (e.g., should they grade... creativity? Communication skills? Group work? Enhanced understanding of the subject? ... and how?). The assessment, so to speak, comes from the real world, since the competition’s referees provide a feedback on the value (and weaknesses) of each story (the reader is referred to Appendix 3 for an example of evaluation by the competition’s referees). Eventually, the stories are real communication artifacts as they are all made public in the project’s website. In short, PoliCultura seems to correspond well to the various facets that define an authentic learning experience (The reader can find in Appendix 2 the list of all the characteristics of this paradigm put against PoliCultura’s main features).

5.2. PoliCultura as a creative experience

As explained in the method section, the 58 “stories” submitted to the competition in year 2020 were analysed independently by three reviewers using an adapted version of the rubric by Henriksen et al. (2015), which revolves around the notions of “Novel,” “Effective” and “Whole,” and scoring each aspect on a Likert scale from 1 to 5 (see Appendix 3). The average scores and standard deviation are shown in Table 1.

Table 1. The average scores and SD to the “Novel,” “Effective” and “Whole” aspects of the 58 stories

	Average score	Standard deviation
Novel	4.53	0.64
Effective	4.28	0.91
Whole	3.91	0.99

It must be noted that the reviewers’ assessment of the creativity of the digital stories is quite high and no story was given the lowest score. How can this be possible? First of all, like in the study by Henriksen et al. (2015), provided that participants make “a fair effort, there is usually some kind of moderate degree of quality or effectiveness. This is rather intuitive [since the rubric] defines a 1 as something that is completely lacking.” Moreover, compared to previous years, the number of submissions (58) was halved, but of higher quality. The reason is that the works submitted in June 2020 had been done by those that could be labeled as “COVID19-resilient” teams, i.e., teams of students led by proactive teachers who had managed not only to keep on track with their teaching but also to complete the work for the competition.

It is impossible to convey to the reader the full spectrum of topics, styles, strategies put into place by the participants (see Appendix 3 for the list of stories and their short description). There follows an example of top-scoring digital stories in the 3 parameters respectively.

Example 1 – top score on “Novel”: Close Encounters of the Third Kind (middle school – Figure 3a)

This is an interdisciplinary work involving geography and science, about the solar system. It is divided into chapters, each devoted to a planet. Groups of 3 students each took care of each chapter, in which – after faking a space mission – they describe the planet from a scientific point of view as if they were reporters from space. The overall plot as well as the specific communication solutions devised by the kids definitely make this work stand out with respect to the standard stories submitted to the program.

Example 2 – top score on “Effective”: From persecutions to the Edict of Milan (primary school – Figure 3b)

After 13 years with PoliCultura, the board of referees was not expecting something new in terms of pedagogical use of the authoring tool, but the story “From persecutions to the Edict of Milan” came as a surprise. Why? Because the teacher devised a clever way to use the program to have kids go in depth into the subject. She decided to focus on content gathering (step 3), deliberately giving less emphasis to all the other steps. Most of the students’ effort was therefore put on desktop research, based on which they wrote the scripts that they enacted in front of a green screen. Then, in post-production, an image related to the story’s topic was added as a background. The result is standard, in terms of communication quality, but ingenious from a pedagogical point of view. On one side, the students are pushed to learn the subject thanks to the intense desktop research, on the other, they feel motivated (by the performance, the product, the competition, ...) as well.

Example 3 – top score on “Whole”: “Ubi tu Gaius, ego Gaia” (high-school – Figure 3c)

A work about “Love and Marriage in Ancient Rome.” After a research on contemporary and ancient sources and a thick interaction between the groups and the teacher that went on “24/7, thanks to our common chat,” the students created a theatrical performance and turned it into a digital story that hooks the viewer till the end.

Figures 3. (a) Kids faking a space mission to Mars, in their bunk bed and wearing motorcycle helmets (middle-school); (b) kids reading their script “in a catacomb” (primary school); (c) students disguised as ancient romans, enacting a marriage (high-school)



5.3. PoliCultura’s key elements

As explained above, teachers are asked to submit pedagogical reports about the experience, the analysis of which shed light on how the educational experiences were run and what the key aspects were.

The **teacher’s role** is, 82% of the times, that of a facilitator. This is quite typical, with a complex activity like PoliCultura that involves different expertise and requires students to be active participants.

Collaboration and **group work** characterize 100% of the experiences: they take different forms, in the sense that sometimes it is kids who organize themselves into groups (especially at higher levels) and sometimes it is the teacher who organizes the groups; sometimes, students are asked to try all the activities, from desktop research and script-writing to the most technical tasks (video-editing, image-editing, ...), but most of the times (76%) they are allowed to perform those tasks that best **fit their talents**: for example, those who can draw well are asked to make the drawings, while those who are good at writing work on the scripts. The promotion of individual talents is acknowledged as a motivator (for a discussion of the pedagogical implications of these different approaches, see Di Blas & Paolini, 2013b). In any case, the story is always the result of a collaboration.

The use of “**external resources**” (families, relatives, local experts...), takes place in 93% of cases. One teacher (in a previous round) shared this insight: “in the last few weeks a father came to work with us and this made us feel less lonely and created a warm climate of complicity in the class that did not end within the classroom’s walls. From that moment on, we broke all internal hierarchies, bypassed the school bureaucracy, and we transformed the lesson into a true laboratory of ideas and learning. Now that everything is over, we are really proud of what we have done, and we feel almost “empty” without those hours in which teachers turned into pupils, parents became experts, but above all the kids constructed knowledge by themselves.” Eventually, the promise of **visibility** and the participation to the competition are considered as powerful motivators by 83% of the teachers.

6. Conclusions

The results of the study confirm that PoliCultura is a collaborative DST experience that can be labelled as “authentic” and is capable of fostering creativity. The program is characterized by teachers that take an active role as facilitator (rather than “sage on stage”), strong collaboration and group work for the students, where talents are enhanced, the opening to external support from families, other colleagues, experts and eventually the visibility provided by the competition as a powerful stimulus.

Some practical implications, for teachers and designers of educational experiences, can be drawn from these results. As regards teachers, lessons are drawn concerning the “enabling factors” that allow designing an authentic experience in which creativity plays a central role.

Lesson 1: be a facilitator. Don’t be the one who knows and controls everything, rather, leave room for the students. This is in line with the literature: for example, Morris (2018; 2020) says that optimal results in terms of creativity are obtained by teachers who don’t dominate the scene). In a creative activity as PoliCultura, there is no right nor wrong choice (no need to fear to be wrong, in Robinson’s words): students can express themselves and discuss the most appropriate strategies with their peers, under the guidance of the teachers.

Lesson 2: have them collaborate. As not only pedagogy (Scardamalia & Bereiter, 2006; Bryant, 2010) but also other fields like for example design thinking (Gero, 1996) highlight, creativity does bloom in collaborative environments where ideas can be exchanged and refined and new solutions emerge, mitigating pitfalls like “design fixation” (i.e., getting stuck on the one solution the designer is more accustomed to) that occur when working on an issue by ourselves (Purcell & Gero, 1996).

Lesson 3: extend your classroom. Go beyond the school’s boundaries and involve families, relatives, the local museum, experts... Looking for sources of knowledge and support beyond the school books and the school environment fosters students’ agency (Di Blas & Paolini, 2013a).

Lesson 4: identify an external stimulus. Public visibility, even more a competition, are a powerful stimulus to do one’s best. As seen in the state-of-the-art section, “competition” (Torrance, 1987) and “positive sense of challenge” can work as creativity-triggering factors.

Lesson 5: promote talents. Contrary to what happens in daily activities, special projects allow putting into place a different strategy (closer to the one we would find in the work place, where everyone is a specialist of something): students are pushed to work on what they are best at rather than doing everything. Leaving aside the (undoubtedly fundamental) discussion on whether this is “right or wrong” (the reader is referred to Di Blas, 2013), we must note that having students focus on what they are good at triggers their motivation enormously.

On the educational technology designers’ side, these are the lessons’ learned.

Suggestion 1: provide loose tracks. Design a tool that at the same time offers a clear path *and* a wide degree of freedom. 1001stories takes you by the hand, so no teacher feels lost, but at the same time it does not place too tight constraints to their freedom of expression.

Suggestion 2: let the teacher do her job. Leave the pedagogy of the experience into the teacher’s hands. Let the tool support the “dirty work” and leave to the teacher what she can do best, i.e., the pedagogical organization (group work, individual work, who does what, when, ...). Don’t design a tool that puts the teacher in a corner.

Suggestion 3: keep it simple. Keep the technology-knowledge threshold low, if you want the tool to be used by schools (Resnick & Robinson, 2017). The technology behind the tool can be quite sophisticated, but it must be easily usable: otherwise, barriers like lack of competences, lack of time to gain them, will hinder its use.

Eventually, some limitations must be acknowledged: first of all, someone may wonder why there wasn’t a control group to fully validate the results of the study. The reason is that PoliCultura is not an experiment, it is a real service offered to thousands of students (between 1,160-1,450 in the 2019-20 round only) in a real context of use with the “myriad particulars” that make the educational science so hard to pursue (Berliner, 2002). Moreover, given its “living organism” complexity, it would be quite difficult to decide how to design the control group: what should the experience be stripped of? Of the stimulus offered by the competition (minimizing the “authenticity” of the activity)? Of the group-work (eliminating collaboration)? Of all technological tasks, having students work on paper? Or of just some of them? The control group experience might look either too similar,

allowing to draw conclusions on just one/few aspects (e.g., stripping the competition, it might be possible to discover something about... motivation?), or so different as to be *de facto* incomparable (e.g., having students work on paper, by themselves, without a competition nor external stimuli...). In other words, in this study the question is not “whether an armadillo is better than, let’s say, a fish, but how the armadillo works” (Bolchini et al., 2010). Second, further studies should investigate the different school levels, where surely the teacher’s role varies, what students do/don’t do varies, the “stories” style and the content vary, etc. The competition’s referees have the perception that primary school kids’ works are the “wildest” in terms of creativity, but this would need further exploration. Third, which ingredients of the experience are essential or just more important than the others, in order to ensure a “successful” educational experience, is still obscure. Would participants show the same degree of creativity and commitment, without the competition? Would stories be so varied if the tool was more restrictive? Would the educational benefits be so good, if we asked for less (e.g., shorter stories)? These are open questions that are in our research agenda for the years to come.

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Appendix 1

Coding Rubric– Novel, Effective, Whole

There follows the adaptation for the PoliCultura competition of the coding rubric on creativity by Henriksen et al. (2015). The main reason for adapting the rubric was that it had been developed to evaluate products by prospect teachers, who were asked to design mainly lesson plans and educational projects, while in the case of PoliCultura the products are digital stories done by the students. Therefore, sentences like “...relatively standard approach *to the teaching of the subject matter*” were modified into something like “...relatively standard approach *to the creation of a digital story*,” to account for the specificity of the study. It must be noted though that the substance of the rubric was not affected. In what follows, the parts in italic highlight the differences with respect to the original version (which are, as the reader will be able to appreciate, minimal).

Novel

1 – Complete lack of anything unique or novel, lack of content and substance to offer opportunities for novelty (*e.g., a standard story, copying existing models*).

2 – Fairly lacking in unique, fresh or novel qualities. Most elements are quite standard and unconventional.

3 – Relatively standard approach to the *creation of a digital story*. While there may be a few unique qualities, it does not necessarily stand out among other *digital stories*. Average.

4 – Some qualities of uniqueness, and relatively interesting to *viewers*. While aspects may bear certain similarities to standard approaches to *digital storytelling*, it also contains some interesting, fresh or novel qualities.

5 – Strong qualities of uniqueness and exciting or interesting to viewers. Is very novel or different from other examples (*i.e., other digital stories previously submitted to the competition*).

Effective

1 – Complete lack of *pedagogical* effectiveness, and lack of content or substance [...]. A confusing approach, or highly limited presentation of subject that *does not make up a coherent picture* (*e.g., where the contributions by the different groups to the final work are not harmonized*).

2 – Fairly ineffective approach to or presentation of subject matter [...]. May have elements that are somewhat boring, confusing, dry, light on content, or do not sufficiently communicate the subject matter clearly to *viewers*.

3 – Somewhat effective *pedagogical* approach to *digital storytelling*, in that some elements of the approach to or presentation of content work well to communicate the ideas clearly in interesting ways. However, there remain some flaws or areas that lack, or that appear to *communicate* the content less successfully. Average

4 – Effective *pedagogical* approach to *digital storytelling*. Clear, thoughtful and interesting approach to *communicating* the content successfully. Little room for misconceptions or confusion – a coherent approach that appears to lead to solid *and coherent picture*.

5 – Excellent and highly effective *pedagogical* approach to *communicating* the subject. Makes the subject matter clear and comprehensible to most *viewers* and presents it in interesting and engaging ways that make the subject come alive.

Whole

1 – Little or no aesthetic qualities. Poor, or complete lack of, production values, and indicates little or no thought to the design of the learning experience.

2 – Few aesthetic qualities, showing weakness in appeal or production values. Clear flaws or minimal thought given to the design *of the digital story*.

3 – Some aesthetic qualities, but also somewhat conventional or standard aesthetic appeal. Some thought to the design of the digital story is evident, though overall the production values and aesthetic appeal are fairly average. Reasonably well done, but lacking in any “stand out” appeal.

4 – Good aesthetic qualities, and sharp or polished production values. Approach provides some sensory interest (visual, auditory, etc.) for students, with clear thought to the design of the digital story. The aesthetics qualities help make the digital story interesting and thought-provoking to viewers.

5 – Excellent or exceptional aesthetic qualities. Flawless or near-perfect production values. Approach provides rich sensory interest (visual, auditory, etc.) for viewers, and all aspects of the design of the digital story are well thought-out to provide an aesthetically cohesive, or “whole” vision that is exciting, thoughtful and stimulating to viewers.

Appendix 2

PoliCultura as an authentic experience

Table 2. PoliCultura and the characteristics of an “authentic” educational experience

Authentic learning element	How it is described in the literature	How it applies to PoliCultura
Real-world relevance	Activities match as nearly as possible the real-world tasks of professionals in practice rather than decontextualized or classroom-based tasks.	PoliCultura asks students to create a “professional” multimedia product, which is something quite different with respect to what “digital natives” normally do. It means being able to organize the structure of an interactive product, to write scripts for orality and interactivity (using a different syntax, avoiding cross-textual references...), to combine verbal and visual communication...
Ill-defined	Activities require students to define the tasks / sub-tasks needed to complete the activity.	Participants are provided with loose-end instructions, allowing plenty of space for invention. Everything is free, from the topic to deal with, to the structure of the story, the kind of content (slideshow or videos, music or audio...).
Complex, sustained tasks	Activities are completed in days, weeks, and months rather than minutes or hours. They require significant investment of time and intellectual resources.	PoliCultura provides participants with a time frame spanning 5 months to submit their work; the average time needed to complete the story is one month. The task involves different kinds of expertise and resources.
Multiple perspectives	Provides the opportunity for students to examine the task from different perspectives using a variety of resources, and separate relevant from irrelevant information.	This aspect is typical of PoliCultura, where a “system of resources” comes into play for completing the work. The work on the content selection requires to be able to separate meaningful from meaningless sources.
Collaborative	Collaboration is integral and required for task completion	PoliCultura is one of the rare examples of collaborative digital storytelling at school. Everything is done collaboratively and the work is organized around groups of students in charge of specific parts of the story or tasks; they need to orchestrate their effort to create a common “story.”
Value laden	Provide the opportunity to reflect and involve students’ beliefs and values.	The extent to which students are allowed to put forth their points of view, beliefs and values is up to the teacher(s), but this is the case, most of the times, since telling a digital story is typically related to self-expression.

Interdisciplinary	Activities encourage interdisciplinary perspectives and enable learners to play diverse roles and build expertise that is applicable beyond a single well-defined field or domain.	This is certainly true for PoliCultura. In most of the cases, the work is guided by two or more teachers of different disciplines; learners play different roles (e.g., the group leader, the content editor, ...) and these roles rotate among the participants.
Authentically assessed	Assessment is seamlessly integrated with learning in a manner that reflects how quality is judged in the real world.	Most of the time students are not scored on their participation (even if their commitment is quite high), maybe due to the fact that it is quite difficult to assess something so complex and unusual. The assessment, in a sense, is provided by the "real world," i.e., the competition's referees that evaluate the product.
Authentic products	Authentic activities create polished products valuable in their own right rather than as preparation for something else.	All the stories submitted to the competition are whole and complete; they are made public in the project's website.
Multiple possible outcomes	Activities allow a range and diversity of outcomes open to multiple solutions of an original nature, rather than a single correct response obtained by the application of predefined rules and procedures.	There is no "right" story nor "right" way of creating it. Participants are not asked to copy a model but to surprise the referees with ever different interpretations of what the tool can make. The almost 2,000 stories submitted this far are different in terms of style, topic, communication strategy... to the point that they are incomparable.

Appendix 3

The digital stories and their scores

In the following table, the 58 digital stories that were analyzed are presented, together with their scores (on a Likert scale, from 1 to 5, where 5 is the most positive score) by the 3 experts, according to the creativity rubric (Novel, Effective, Whole). SG stands for "School Grade," K stands for "Kindergarten," P stands for "Primary school," M stands for "Middle school" and "H" stands for "Highschool." In addition, a short excerpt from the teacher's report is presented: the reading of a number of them can provide the reader with the "flavor" of the experience.

Table 3. The 58 stories: description, excerpt from the teachers' reports and scores by the reviewers

#	Title and short description of the story	Short excerpt from the teacher's report	SG	N	E	W
1	<i>Agenda 2030: the world is in our hands</i> The keyword "respect" is the fil rouge that makes these very young students understand what a healthy relation with the environment and society can be.	"The second step was to open up to the world. Mrs. S.R., mother of one of our children, came to our aid to tell us about her experience as an orphan in a distant land. The fact that not all children have the same standard of living has been the inspiration to bring a distant idea close."	K	5 5 4	4 5 4	4 4 3
2	<i>Emotions in the magical world of Oz</i> Through the story of the "Wizard of Oz" by L. Frank Baum important issues like self-esteem, self-confidence, diversity and solidarity are addressed.	"For communicating and playing with the deaf companion, the children have learnt the sign language and with extraordinary speed the necessary skills to welcome and include her."	K	4 3 3	3 2 3	3 2 3
3	<i>Sophie's magic</i> A story about a little girl and an inclusive school, where obstacles that sometimes prevent full participation in the social and	"Seeing Sophie with the other children is wonderful, both for the happiness she feels when she is with them and for the empathy, tenderness and care that her companions show to her."	K	5 5 4	5 5 4	2 3 3

	educational life are removed.					
4	<i>Scientists to the rescue!</i> A “story” about scientific thinking and more specifically the concept of time, the transformation of matter (ice-water-steam), the concept of liquid.	“We worked on the development of scientific thinking. The desire was to create a didactic tool containing experiences with a constructivist approach.”	K	5 5 5	2 2 3	4 3 3
5	<i>Between dream and reality</i> The children imagine they are going to visit the fearsome ogre in their village’s castle. Through storytelling, they are stimulated to develop creativity, imagination and curiosity.	“Our theme for this year is: ‘how to pass on’. [...] we are committed to designing and activating experiences that help children develop an individual sense of what is precious. We want children to research and acquire special values, which we define as gifts.”	K	4 5 5	5 3 5	2 3 4
6	<i>From yesterday to today, a dip into the monastic experience</i> A “TV show” about the birth and evolution of Monasticism from the third century AD.	“There was a great spirit of collaboration between the pupils and the teacher. The atmosphere has always been serene, joyful and for everyone it has been an exciting job.”	P	5 4 5	3 2 3	3 2 2
7	<i>From nature to art</i> A work on visual art connected to the children’s locality, with a focus on nature, facilitated by meetings with experts.	“By focusing on some paintings relating to nature and the local landscape by artists, the pupils entered the world of colors, fruits, vegetables and cultural sites in the area. With the collaboration of experts, themed conferences and workshops were held.”	P	4 5 5	4 5 5	2 3 2
8	<i>From persecutions to the edict of Milan</i> A project that tells the story of Christianity from its origins on the day of Pentecost to the edict of 313 AD issued by the emperor Constantine.	“The purpose of the work is to push students to get to know a curricular topic becoming protagonists of the knowledge acquired and passing it on to other classmates [...] in fact, this topic of study was addressed in parallel classes through the vision of the video made by these students.”	P	5 5 5	5 5 5	2 3 2
9	<i>The beginnings of Christianity</i> This project tells the story of the origin of the Church and its development especially in the first century AD.	“The children, starting from the texts given by the teacher, were divided into working groups, they reworked the contents to create narratives to be rendered in the form of a documentary.”	P	5 5 4	5 5 4	2 2 3
10	<i>Back in time with Saint Paul</i> The goal of the work is to tell the story of St. Paul trying to frame him as a historical figure, discovering who he was and what he has become for the Church in the very early years of Christianity.	“...creation of a storytelling made as if it were a small documentary. Both the pupils and the teachers actively participated, in a general climate of active cooperation, interchange and natural joy.”	P	4 5 5	4 5 4	4 4 5
11	<i>I stand by Vanessa</i> A very original “silent book” that tackles the issue of bullying through the story of little Vanessa, revealing the importance of small daily gestures capable of counteracting hypocrisy and indifference.	“Experience has shown that bullying mainly happens at school. Therefore, it is the school’s duty to monitor the students, offering an educational path that allows them, from an early age, to recognize their feelings and communicate them, to reflect on the feelings of others, suggesting strategies for coping with the strongest emotions.”	P	3 4 5	3 3 5	4 5 4
12	<i>Fairy tales are dreams that can</i>	“If fairy tales are dreams, can they	P	5	5	3

	<i>come true</i>	become true? Sometimes, yes! And that's why Niky came to visit us. He told us his story and got interviewed by the children, who turned into journalists. The doctors diagnosed little Niky with chronic asthma and advised his parents to take him to live by the sea. His parents [...] decided to build a boat in their backyard. After months of hard work, the Walkyrie schooner of more than 20 meters, thanks to the special transport and navigation of the river Po', reached the sea, where Niky's dream came true."		5	2	3
	The story reports on a multifaceted educational experience where the reading of fairytales is intermingled with meetings with "real" people who have made their dreams come true.			4	2	4
13	<i>To live, see, discover Martina Franca</i>	"The use of new technologies and teamwork immediately motivated the pupils to engage in the project. The multidisciplinary and interdisciplinary work was carried out during school hours of history, technology, art, innovation and English."	P	3	5	3
	The motto of this work is: "you can read a town like a book: every stone is a page of history." The goal of the story is to introduce little-known places and traditions of the children's hometown to everyone.			4	5	4
				5	5	3
14	<i>More nature, more life!</i>	"In all phases the work was organized trying to leave a lot of space for the children, starting from their natural curiosity and allowing everyone to interact freely. In the various activities, the pupils were divided into heterogeneous groups, chosen by the teacher, where everyone contributed to the whole work."	P	5	4	5
	The story is set in the school garden used not only for recreation, but also as a laboratory full of life and natural elements that children have discovered through exploration, observation, manipulation and gardening.			4	2	4
				5	5	5
15	<i>Knowledge and taste</i>	"The class was divided into heterogeneous groups and the roles were distributed taking into account the preferences of each pupil and personal aptitudes. In some cases an attempt was made to stimulate pupils to try their hand at something new, overcoming fears and lack of self-esteem."	P	5	5	5
	The theme of the story is food. Starting from personal experiences by the students, it aims at promoting a more aware and responsible attitude towards nutrition and food in general.			4	2	4
				4	4	4
16	<i>We are good together when ...</i>	"...an attempt was made to act on the child's daily experience, preparing him/her for the convinced and participatory recognition of the rules of democratic life."	P	5	5	5
	A story on rights and the value of rules, to learn to live together in an active and peaceful way and to become aware citizens.			5	5	4
				4	4	4
17	<i>Humanity on the go</i>	"In class we talked about the expectations of the trip, how much you want to leave or not and the reasons behind a trip; [...] the children interviewed their parents who had moved to Italy for different reasons."	P	5	5	2
	A poetic story about migrants and travels, including the personal experiences of some of the kids' parents and relatives.			5	5	2
				5	5	3
18	<i>The dream planet</i>	"In order to develop critical skills in the students, in addition to a self-assessment by each group of their work, the whole class evaluated the whole work: examining if the texts were suitable for oral use, if the length was adequate, if the images	P	4	4	4
	A path of emotional and cultural exploration and awareness raising on sustainability issues, human well-being, environment protection and care of our common home, in the light of the			4	4	3
				5	4	5

	2030 Agenda.	were in adequate number and consistent with the text.”				
19	<i>United we say NO to bullying</i> A story about bullying and cyberbullying, including the rap song “The nursery rhyme of the repentant cyberbully”.	“Role-playing activities were used to represent the bully, the victim and the spectators, with simulations, improvisations, games. [...] Each phase of the project was experienced with great enthusiasm by all the pupils. There has never been a moment of fatigue, even when it happened to repeat shots, scenes or other to improve the performance.”	P	4 3 5	5 2 4	4 3 5
20	<i>Walking among the Forts of Messina</i> A story of discovery and knowledge of the territory. The pupils have learned that Messina (a town in Southern Italy) hides unknown beauties of great historical value.	“Due to the pandemic, it was decided that each student would focus on a specific fort and create a multimedia presentation to share with the other classmates [...] In this way ALL the pupils have taken part to the project.”	M	5 5 4	5 5 4	5 5 4
21	<i>At the twenty-second mile of the Via Salaria ... Saint'Antimo...</i> An ancient narration that begins with the dream of a prince named Anthemio, from which the town where the kids live in is said to have originated...	“From the texts, the testimonies and some interviews with local historians our work has begun. The students worked in separate groups and produced a video. This video reports an interview to the parish priest of the church of Saint'Antimo...”	M	5 5 4	5 4 4	4 5 4
22	<i>Etna Sustainable Annular Cycle Path</i> The narration unfolds starting from the proposal to create an annular cycle path around the volcano Etna (southern Italy) with the indication of the route, and the description of the landscapes, places, fauna, flora and also information of a gastronomic and historical nature.	“The base for the work came from different sources: internet, cartographic material, historical and scientific texts. Students worked three school hours a week, three afternoon hours a week, from January to March 6; from April to May the work was carried out remotely, using Google Meet, to a total of about 80 hours.”	M	5 5 4	5 5 4	5 5 4
23	<i>Ecology of a virus</i> The Coronavirus (personified as a character) tells, in a quite engaging way, all its characteristics, highlighting the lifestyle people were bound to conduct during the lockdown period.	“The work was divided into three phases. (1) information: the students looked for info on the web; (2) operational: production of family interviews as evidence of the current situation; (3) creative: the kids created audio and video.”	M	5 4 5	5 4 3	5 5 5
24	<i>Climate changes</i> A raising-awareness story about rising temperatures, melting ice, rising sea levels, increasing extreme weather phenomena, desertification, climate-related migration, economic damage, loss of biodiversity.	“The teachers involved in the project believe that making students ‘create’ is an effective and educational experience. [...] Students, divided into groups, combine images and words to capture the attention both with images and with verbal communication.”	M	5 4 5	4 5 4	2 4 3
25	<i>The great cemetery of Messina</i> A short story about a graveyard in Messina (Sicily, southern Italy), artistic testimony of the grandeur with which the cult of the dead was observed in the past.	“The kids together carried out a research work on the great cemetery of Messina, a poorly known cultural asset. They listened to the readings chosen by the teacher, during the remote lectures, and searched for the photos to be included in the work on the internet. The kids really teamed	M	4 5 4	4 5 4	4 3 3

26	<i>Close encounters of the third kind</i> A funny story about fake interplanetary expeditions from which the main characteristics of the planets that make up the solar system emerge.	up.” “The ‘transversal’ goals are: to be able to find effective solutions to problems encountered in the implementation of the project, starting with the identification of the best technological solutions; to work as a team to achieve a result greater than the sum of the individual contributions.”	M	5 5 5	4 3 5	5 5 5
27	<i>The Moon: shining object of desire</i> Fantastic tales and expressive reading complemented by drawings made by the children intertwine the red thread (the Moon) that runs through the narrative allowing the free expression of desires and emotions.	“The pandemic, which started at the end of February, changed the initial project, making it also an opportunity to feed the imagination, at a time when reality was not easy to accept, and to involve pupils, from a distance, helping them stay connected thanks to digital tools.”	M	4 4 4	5 5 4	4 3 4
28	<i>Our impossible interviews</i> A gallery of “portraits” of great women who have distinguished themselves in STEM.	“The students were divided into groups of three/four, according to their choice, considering that part of the work would take place in extra-school hours. Roles have been established: character, interviewer and movie director.”	M	4 5 5	4 5 5	5 4 4
29	<i>Leonardo: an artist always on the go</i> An imaginary interview to discover a brilliant character through the places he traveled through during his life, an opportunity to find out who he was and what legacy he left us.	“Considering that the aspect to be privileged is orality, the communication genre of the interview was chosen. Furthermore, in this way, all the children had a place in the final product and learned to manage the emotion of expressively reading aloud and, above all, the emotion of recording and listening to their own voice.”	M	5 4 5	5 4 5	4 3 5
30	<i>Manduria and us, today and yesterday</i> Narrative of love for the students’ hometown, with a focus on the natural and cultural beauties of the area and an historical excursus between past and present.	“Goals: (1) encourage a learning process based on the “mixing” of formal and informal sources and on the creative mash-up of pre-existing didactic contents; (2) strengthen identity, self-esteem, comparison with others, recognition, personal growth and acceptance; (3) regulate the level of confrontation and conflict with others by encouraging collaboration, also between pupils and teachers.”	M	5 5 4	5 5 4	5 5 3
31	<i>Margherita among the stars</i> This story answers the question: can a brilliant and extroverted character like Margherita Hack serve as an exemplary figure and guide life choices?	“The autobiography ‘A life among the stars’ sparked the idea of synthesizing the life of Margherita Hack through short animated sequences. Building a cooperative product by manipulating content is an interesting goal that can be easily achieved using animation apps.”	M	4 5 5	4 5 5	4 4 5
32	<i>STEM woman worker</i> Original narration dedicated to an important character of the school: the school’s principal. The students interview her about her	“According to the principles of the challenging ‘enactive teaching’, more than the learning of predetermined contents, the experience of building knowledge – in our case, of a	M	5 5 5	5 5 5	5 5 5

	life and her vocation to STEM and in particular to biochemistry.	citizenship respectful of the female gender – matters.”				
33	<i>Story of an (almost) successful twinning</i> Territory, history, art, culture are the chapters of a documentary about two “twin” cities in Italy.	“Surely, the work for PoliCultura has made the bond between the children and the teachers involved even stronger.”	M	5 4 5	5 4 5	4 4 5
34	<i>Tale of our “flipped” classroom</i> Tale of how the students faced the study of science and mathematics through the methodology of the flipped classroom.	“Roles were defined by the teacher, but the attribution took place independently within each group. - web researcher - graphic designer, - text editor, - video editor. Each pupil was in charge of one aspect, but before the delivery the work was reviewed by all members of the group.”	M	5 3 5	5 3 5	5 3 5
35	<i>A planet on its knees</i> The topic addressed is that of climate change, through the story of Grandma Flo (personification of mother Earth) and her granddaughter, conceived and created by the children with their beautiful drawings.	“We relied on the action-research approach. An attempt was made to promote as much as possible active learning by the pupils, placing them at the center of the teaching activity, while the teacher played the role of tutor in the process of knowledge discovery-acquisition.”	M	5 5	5 5	5 5
36	<i>A year-long earthquake: stories of resistance and resilience under the Mongibello</i> It was chosen to analyze from a scientific and emotional point of view the event of the earthquake that in December 2018 hit the municipality where the school attended by the children is located.	“Study of earthquakes: it was chosen to address the topic in a different way, not only from a scientific point of view, but also from the point of view of the effects on the lives of people who are affected by an earthquake.”	M	4 5 3 5	4 5 3 5	4 5 3 5
37	<i>The dream school</i> The narration tells the dream of a new school, conceived and designed starting from the knowledge of how the school attended by the children has changed in the last 60 years.	“We believe that the project has benefited the students who were very willing to deal with the proposed activities. In particular, the assignment of specific roles has highlighted special talents that would have hardly surfaced with a more traditional teaching method.”	M	5 5 5	5 5 4	2 3 3
38	<i>“Ubi tu Gaius ego Gaia”</i> A work about “Love and Marriage in Ancient Rome.” After a desktop research, the students created a theatrical performance and turned it into a digital story that hooks the viewer till the end.	“The focus was on the peer group, which formed a sort of social laboratory, in which to develop dynamics, experiment with activities, plan, share, improving self-esteem and relational and communication skills.”	H	5 5 5	5 5 5	5 5 5
39	<i>3,14159265 and many other stories</i> The protagonist of the project is the number most invoked by students from all over the world: pi. In the work, properties and stories about it are told.	“Three disciplines were involved in the activity: literature, mathematics and English. The literature teacher followed the part relating to the communication and storytelling techniques. The math teacher developed the topics during the workshops. The English teacher	H	4 5 5	4 5 5	4 5 5

		followed a group that decided to make their part in English.”				
40	<i>A Day in Prison</i> The story features the dark and tormented atmosphere of a women’s prison. It was born out of the desire to fight to live in a better world where the strongest do not prevail and where everyone can exercise their freedom of thought and action.	“Through this project it was possible to rediscover how important it is to learn to know each other, especially among peers and to understand with great surprise the precious value of friendship. Each student managed to share emotions and thoughts, they treasured this experience, transforming it into an opportunity to improve themselves.”	H	5 5 5	4 5 5	4 5 3
41	<i>Water fun!</i> The story examines the theme of exploitation of water resources and sustainability from multiple points of view, starting with the study of rainfall in the students’ home town.	“During the activities, the students were able to experiment with new tools and languages with an advantage in particular for communication skills.”	H	5 3 2	5 3 5	2 3 2
42	<i>Counselors for a day</i> Students pretend to be counselors of their local district for a day, to become aware of an active citizenship and communicate it to others.	“The project is valid and has given rise to unexpected inclusions. [...] The tasks were divided between teachers and students according to their skills. The kids evaluated the experience well because they felt like protagonists.”	H	5 5 3	5 5 3	5 5 3
43	<i>From the very small to the very large</i> This work is a light and poetic presentation of two great Italian scientists who, thanks to their work, have given great prestige to their nation.	“... the derivations from Latin of some scientific words have been studied; we synthesized content to write the scripts. In the hours of Natural Sciences, the concepts inherent to the smallest parts of matter, atoms, molecules, were developed and deepened, to then move on to the study of planets, galaxies and black holes. In the Communication Techniques discipline, verbal and non-verbal communication was studied...”	H	5 4 5	5 4 5	5 4 5
44	<i>Ecojournalists or “Bedroomdesk Activists”</i> The project aims at helping students to understand that each of us belongs to a larger ecosystem, and that we must be responsible toward our environment.	“Students were not only asked to play an active role in the decision making process, but they felt free to express their own opinions, using creative technological media.”	H	5 5 4	5 5 4	5 5 4
45	<i>Here I am!</i> A story about education as the key to the fulfillment of the students’ most colorful ambitions and most obstinate aspirations, as the missing piece of the puzzle to ensure that the picture of life is complete.	“Taking paper, pen and aspirations, they wrote bold words which they then attached to their backpacks. Words like ‘dream, future, ambition, school, study, youth, world, life, curiosity, passion, truth, thought, word, head, heart.’ They wrote them in Greek and Latin to show that besides their dreams, they know declinations well. Then they translated them into English, because they love to feel global. And if they could, they would also have included all the other languages of the world. Because it’s the world they are	H	5 3 5	5 3 5	5 3 5

		aiming at.”				
46	<i>Gambling: an experience between history and probability of success</i> The project describes the most famous games of chance, highlighting their evolution over time and the low chance of winning considerable sums.	“From the point of view of competences, attention was paid to the ability to communicate, collaborate and participate both within the class group and with the teacher.”	H	5 4 4	5 4 4	5 4 4
47	<i>The advertising language between history and modernity. From Aristotle to coca cola</i> A story that, starting from the ancient philosophers, passing through the literature of the ‘300 and arriving to the modern advertising messages, teaches “to look, not just to see.”	“I decided to participate to the project with my students to activate more active and profitable learning processes, which are generally experienced solely as functional to passing a test.”	H	5 4 4	5 4 4	5 4 4
48	<i>Double interview</i> The story stages impossible interviews, as a couple, with famous people from the scientific world.	“The teacher’s goals were: - have the students investigate the topic not only from the purely scientific point of view but also literary and philosophical - promote the ability to grasp links between historically distant events - Stimulate collaboration among students by creating heterogeneous groups, thus stimulating the less performing students.”	H	4 3 5	4 3 5	4 3 5
49	<i>Latinae historiae</i> Latin comics in which the students identify with the children of that world who lived the situations of an ordinary day and spoke the language of their time.	“With this study method, the pupils were constantly stimulated to think directly in Latin and so they wrote short comic stories in that language about life in ancient Rome. These same stories, drawn on the billboard, were then photographed and inserted in 1001stories accompanied by audio. Latin immediately came alive, in colors, images and sounds.”	H	5 4 4	5 4 4	5 4 4
50	<i>Epidemics in History</i> The project explores at an interdisciplinary level what is one of the most important events for our generation: the Coronavirus pandemic.	“The goal of this short documentary is to turn culture into an ‘active heritage’, a useful and extremely precious tool for understanding current events.”	H	5 4 5	5 4 5	4 4 5
51	<i>In our school, 130 years ago, “rose sickness” was treated</i> History of the students’ school building, which in the past was a provincial hospital specializing in the treatment of a disease, pellagra, very common among the farmers of the area.	“In general, this experience offered students the opportunity to reflect on the mixture of ancient and modern that characterizes the area in which their school is located.”	H	5 5 5	5 5 5	5 4 5
52	<i>It is no longer tomorrow</i> The macro-theme is that of the environment, with a two-fold focus: on one side, the kids’ own territory, through the analysis of the local environmental changes, on the other, the global issues that, although apparently distant, are actually particularly close to	“The peculiarity of the work lies in its articulation around a narrative nucleus: we have in fact inserted the problems within a real story, in which the protagonist, a scientist from a recent past, interacts with other characters.”	H	5 5 4	5 5 4	4 5 4

	our daily life.					
53	<i>Science: a “feminine” substantive</i> Historical excursus on the presence of women in the field of science since ancient times.	“Students worked in groups, each in charge of different bibliographic searches (mainly on the internet).”	H	5 4 5	5 4 5	2 4 5
54	<i>Cubed Stories: a Doodle is to blame...</i> During the pandemic, an activity was born that involved history, Italian and biology at the same time. Urbani, Röntgen who were they? Students created 3D biographical cards of scientists whose discoveries revolutionized the history of medicine.	“Each student / student pair produced their own ‘cubed story’, which they exhibited during streaming meetings by introducing their scientist, answering their peers’ questions, and interacting with other peer–scientists in a ‘round table’ simulation.”	H	5 4 5	5 4 5	3 4 5
55	<i>A monument to Giustino Fortunato</i> A project on a historical figure who studied the problems of the social and economic crisis in the South of Italy after the national unity.	“The students were initially a little fearful, but starting to work and understand the mechanism of the project, they got excited, especially in the phase of creating the audio and inserting the contents into the 1001stories tool.”	H	5 4 5	4 4 5	4 4 5
56	<i>I wish that day was tomorrow</i> Analysis and interpretation of letters sent during the Great War by soldiers or civilians who participated in some historical events from the front or from their places of origin.	“The activity has undoubtedly contributed to making students more aware not only of the principles that govern the drafting of creative texts, but of the accuracy they require when they are based on historical events reconstructed with the rigor that belongs to the historian.”	H	5 4 5	4 4 4	4 4 5
57	<i>Water, the world power</i> A research on water, accompanied by videos of experiments carried out at home by students during the pandemic.	“Each group chose how to present their part of the story: via a video, a presentation, a poetic text, the soundtrack for the poetic text. The product of each group was then corrected and adapted by the teachers.”	H	4 5 5	2 2 2	3 4 5
58	<i>Interview with Bernardo Buontalenti</i> A documentary about a brilliant artist from Grand Ducal Florence, inventor of ice cream.	“13 simulated interviews with the artist [were made]. Eight kids alternated in the interpretation of the character and the others in the role of interviewer. All students were involved in the script-writing, while a smaller group specialized in editing the videos.”	H	4 2 4	4 2 4	3 2 3

Example of the final, public, review (synthesizing the opinions and scores by the 3 reviewers) for the story “Ecology of a virus” (number 23 in the table above): “A narrative definitely in step with the times! Determined to deal with an ecological issue, students and teachers are taken by surprise by the pandemic like everyone else and, after an initial discouragement and temptation to give up everything, they decide to change course and to deal, with great proof of resilience, precisely with the hottest issue of the moment. A good research work, an excellent capacity for synthesis and communicative effectiveness give us back a learning object in which the virus itself tells its own “story,” through the words of the students. The idea of combining images and texts in the slides that scroll on the screen is very effective in supporting the user’s focus on specific topics. The use of multiple voices in the reading gives a good rhythm and makes you want to find out how the story will end, thanks also to a note of lightness that flourishes in the words and drawings of the children, giving us hope in a moment in which it is a more than precious commodity.”

Appendix 4

The teachers' reports on the experience

There follows the schema of the reports teachers were asked to fill in when delivering the digital stories.

Report's fields	Directions/prompts on how to fill the field
Story title	Insert here the title of your story
School	Insert here the name of your school; please specify the school grade (Kindergarten, Primary school, Middle school, Highschool)
Teachers and students involved	Which teachers were involved in the implementation of the project? How many were they? How many students were involved?
Short description of the experience	How the idea of participating was born, how the topic was chosen, how the children were motivated, how other colleagues were involved (if applicable), how families were involved (if applicable) ...
Format of the story	Here you have to specify whether your story is "complete" (i.e., entailing chapters and sub-chapters) or "compact" (with chapters only). [The 1001stories authoring tool allows creating linear stories, composed by a sequence of "chapters," or hierarchical stories where there are also sub-chapters]
Relationship with the curriculum	Please clarify whether the work was: <ul style="list-style-type: none"> - related to a single subject (e.g., English, history...) - multidisciplinary - interdisciplinary - extracurricular
Subjects involved	Please list all the subjects that were involved in the project
Where / when the work was done	In what context did the educational experience take place? (tick all that apply) <ul style="list-style-type: none"> - at school, during school hours - at school, beyond school hours - at home - on the territory - other
Learning goals and educational approach	Can you please share some details on this? What learning goals had you set? What pedagogical strategies were put into place in order to achieve them?
Tasks and roles	Distribution of tasks and roles among students and between students and teachers in the various phases of the work: were the students divided into groups? Who chose who should work with whom? The teacher or the students themselves? How were the diverse talents and attitudes taken into account? Were all the students asked to try all the activities or did everyone do what she was best at doing? Did students swap roles? Were groups homogeneous or heterogeneous in terms of performance?
Implementation of the experience	Please describe in details how the experience was organized and implemented, from the topic's identification to the content gathering and refinement up to the upload of the various parts into the authoring tool and the final evaluation of the result.
Space, time, tools	Please describe where, when and using what technological tools the work was done [apart from 1001stories, participants may use a number of other tools, like video or image editing tools]. Where did the project take place? How long did it take to work on the project? How much and what work was done in the classroom and how much at home? What tools were used?
Help / support	Were you supported by someone outside your group? (please tick all that apply) <ul style="list-style-type: none"> - The students' families/relatives - Local authorities - Experts on the subject (e.g., a museum's curator) - Conventional sources (e.g., the local library) - Internet

Distribution and dynamics of “knowledge” Overall evaluation	<p>- Not applicable</p> <p>Can you please share some details on this? (e.g., please clarify for what specific tasks you were supported)</p> <p>Please describe who learned what and from whom/what source (teachers, students, books, the internet, experts...).</p> <p>Evaluation of the whole project and of the educational experience: what worked well and what did not work? What problems did you meet and how did you manage to solve them? What educational benefits did the students gain? How can the experience be improved?</p>
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