

# Maestro Martino: Designing a Historic Escape Room With Primary School Children

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**Abstract:** Educational escape rooms are being used in all school sectors and in many different subjects across the globe. In most documented cases, escape rooms are designed by teachers and played by students. This paper presents the case study of a primary school class that designed and developed an escape room for both adult and young players in connection with a regional event connected to a historical celebration. The project spanned over the whole school year and included a learning phase, the production of support materials (as comics) and eventually the design and development of the escape room, which was finalized by a local association. After its installation in the ancient local prison, the escape room enjoyed the visit of over 600 players, including tourists, families, groups of friends, and school classes, representing a successful example of open school game design project. The paper presents the key phases of the project: requirement analysis, escape room design (including narrative, puzzles, game-flow and props), escape room implementation, and assessment, with a focus on how to manage complex game design with young children.

**Keywords:** Escape room, Primary school, Open school, Game design

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## 1. Background

According to Nicholson (2016), escape rooms are “live-action team-based games where players discover clues, solve puzzles, and accomplish tasks in one or more rooms in order to accomplish a specific goal (usually escaping from the room) in a limited amount of time” (p. 18). Commercial escape rooms are often developed around a theme and blend different types of challenges, including those that require teamwork and collaboration.

The use of Escape Rooms (ERs) as a game-based learning activity can be considered a relatively new but not anymore uncommon educational practice internationally. Several educational ER experiences and studies have been reported in higher and adult education (Fotaris and Mastoras, 2019; Mijal et al., 2020; Veldkamp et al., 2020), while only a limited body of work explores the same topic in middle-school, primary school or kindergarten (Fotaris and Mastoras, 2019; Hod-Shemer and Dabush, 2020; Babazadeh and Frigerio, 2021; Babazadeh, Botturi & Reggiani, 2022).

Educational ER support discovery-based learning in a playful context, and are usually framed as examples of active, collaborative, team-based and/or game-based learning (Veldkamp et al., 2020). In most documented cases, teachers integrate ERs as learning activities for their students (Botturi and Babazadeh, 2022). The games are either designed by teachers themselves or adapted from commercial or open repositories (e.g., breakoutedu.com) and played by students. While not yet conclusive, research evidence suggests that ERs are powerful instructional devices for both subject matter learning and life skills or transversal competences development (Babazadeh et al, 2022).

### 1.1 Designing Escape Rooms With Pupils

This paper takes a different perspective: it does not focus on the use of an educational ER for game-based learning, but on a project-based learning experience designed around a collective game design process. More precisely, it presents the case study of a primary school class that designed and developed an escape room on historical content for both adult and young players in connection with a regional event.

While proposed in ER-related handbooks (Botturi and Babazadeh, 2022), such an approach is much less documented in the literature. To our knowledge, only two recent studies illustrate similar cases. Karageorgiou et al. (2019) analyzed a digital VR-based ER school design project in a vocational high school. The process included 20 steps, from design to marketing, and resulted in high satisfaction and learning. Botturi and Babazadeh (2021) presented the case study of a lower secondary school project, in which the students, a few weeks before the breakout of the Covid-19 pandemics, developed an educational ER on viruses. In that study, the authors analyzed both subject-matter learning (for which positive results were reported) and the development of leadership and communication skills (which were only mildly improved).

The present case study brings three distinctive and innovative elements: it presents the collaborative design of an educational ER as a project-based learning experience; it took place in a primary school, which is an uncommon setting for such an endeavor; and it was embedded within a wider collaboration of the school with an external and independent non-profit association organizing a regional cultural event.

The intent of the paper is threefold: (a) confirming that the design of an escape room can represent a suitable challenge for project-based learning; (b) illustrating how the collective design of an escape room can be practically arranged in primary school; (c) documenting how game design as a learning activity can provide opportunities for opening the school and connecting with the environment.

## 1.2 Celebrating Maestro Martino

In the XV century, Maestro Martino (born Martino De Rubeis) was chef at the court of the Sforza in Milano, and later in Rome private cook of two Popes, Paolo II and Sisto IV. Known as The Prince of Cooks, he is the author of *Libro de Arte Coquinaria*, the first recipe book in the Italian Renaissance. Few know that this artist and innovator was born in Grumo, a small village in Valle di Blenio in Switzerland.

For celebrating his 500<sup>th</sup> anniversary, a local association (Blenio Bellissima; <https://bleniobellissima.ch>) developed a concept for connecting exhibitions and events in the region, including *gourmet hikes* and Renaissance dinners in local restaurants, translating and reviving Maestro Martino's original recipes with the aid of contemporary chefs. A teacher at the local school took up the challenge and proposed his Grade 3 class of 16 pupils (9 boys and 7 girls) the development of an ER about Maestro Martino to be included in the official celebration program. The goal was making it a learning experience through which the players would learn the story and importance of Maestro Martino. The author of this paper was invited as expert ER designer to support the project.

The case study was designed as an ongoing participant observation and documentation of the design process and of the underlying learning process, in which the author was engaged as reflective practitioner (Iacono et al., 2009). The design process was documented through the collection of pupil-produced artefacts; feedback was collected from the teacher at key moments in the process. Given that no data was collected from the pupils, according to the author's home institution, no formal approval of the ethical committee was required.

## 2. Designing an Escape Room With Pupils

The ER design project spanned over the whole school year. The opening of the ER to players was scheduled for the first Saturday after the end of the school year in June 2022. The design was structured into 5 phases, as illustrated in Figure 1:

1. Visit and requirements analysis;
2. Learning content;
3. Learning to design;
4. Design for learning;
5. Development.

The central phases (2-4) were conducted with the class; phase 1 was managed by the teacher and the author of this paper, while phase 5 was managed by the organizing association.

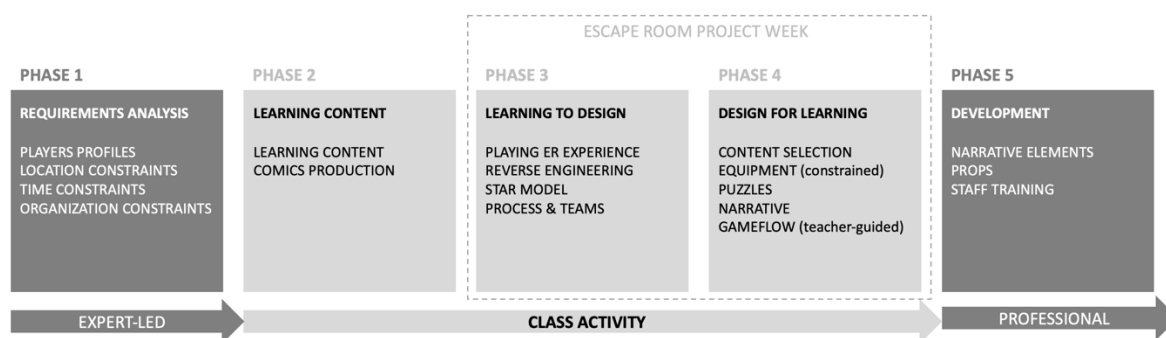


Figure 1: The five design phases and their main outputs

## 2.1 PHASE 1: Requirements Analysis

The requirements analysis was conducted by the teacher and the author of this paper with the organizing association. The ER had to be designed for two types of players: (a) small groups of tourists, both adults and families; and (b) primary and lower secondary school classes. It should last in both cases about 45 minutes. This meant having two versions of the ER: one with more complex puzzles and language for the former target group, and one with easier puzzles (or more hints) and simplified language for the latter.

The selected location for the ER was the House of the Landfogti, a 500-year-old stone building which hosted the German-speaking ruling family of the valley in the XV century. The House hosts a local history museum, and the prison cells of the House, located in the first floor, were made available for the ER. A visit to the location allowed identifying some constraints: the space was divided in two small non-communicating rooms, and no physical lock-in was possible. No video system was available, so that remote assistance could not be implemented.

Moreover, the ER would be managed by the museum staff on top of their regular duties. This meant that the ER should require only a few minutes for rebooting and that the introduction to the game should be self-explanatory. These requirements were written and agreed upon and kept for phase 3.

A second visit to the location was organized with the pupils, so that they could measure the available spaces and see the historical environment that would host their escape room.

## 2.2 PHASE 2: Learning Content

The class engaged in the ER design project had of course to first learn about its content, i.e., the history of Maestro Martino. This was achieved in the first part of the school year (October-January) under the guidance of the teacher and was framed as a media project: the pupils engaged in the design and production of a comic book presenting the history of Maestro Martino: after reading historical materials and visiting the key places in the region, they wrote the text, collected pictures, created *ad hoc* costume illustrations and finally edited the comic book (Figure 2), which was then included as a support material in the ER.



Figure 2: Sample Page Of The Comic Book of Maestro Martino

## 2.3 PHASE 3: Learning to Design

Phase 3 and phase 4 were scheduled as a block escape room project week in March 2022, co-designed and co-led by the class teacher and the author of this paper.

Phase 3 was condensed in the first 1,5 days on the week: its goal was creating shared experience and understanding of what an (educational) escape room is and to provide the conceptual framework required to carry out the design. As many pupils never played an ER, it started with playing an educational ER from BreakOutEdu.com on sustainability titled *Save the Earth!*, and then trying to reverse engineer it, i.e., identifying and describing the key elements that compose an ER. Pupils easily identified the *narrative*, *puzzles* and *equipment* elements, and also, with some help, the *learning goal* of the ER. Only after some discussion they

managed to focus on the *game-flow*, i.e., on the actual structure and organization of the ER. Such reverse engineering was structured according to the Star model (Botturi & Babazadeh, 2020; Figure 3), which was then kept as main reference for the design. Other models were also considered like the Experience pyramid model (Heikkinen & Shumeyko, 2016) and Room2Educ8 (Fotaris & Mastoras, 2022), or the process described by Karageorgiou et al. (2019). The star model was preferred because it has a limited number of key elements and clearly distinguished between design (the star) and context (the outer circle) elements.



**Figure 3: The star model for educational escape room design (from Botturi & Babazadeh, 2020).**

The experience with the ER from BreakOutEdu.com was also useful to let pupils see how an ER session works (presentation, rules of play, narrative introduction, game, debriefing) and handle padlocks, boxes and hasps – the materials that they could also use in the project.

## 2.4 PHASE 4: Design for Learning

Phase 4 took the rest of the project week, and its aim was twofold: (a) designing the ER, and (b) producing a full set of draft materials. This was indeed the most challenging part of the process, as it included the actual design work, and was carefully organized and managed streamlining the Star model elements, as illustrated in Table 1.

The learning goals identified in step one included three domains:

- Factual knowledge about Maestro Martino: where and when it was born, the title of his book and when it was written, in what cities he worked and for whom.
- Curiosities about the recipes, including that time was measured in prayers and that common ingredients had different names than today.
- Eating habits and manner, in particular referencing the “rules of the table” supposedly written by Leonardo in the same period, that illustrated how people should behave when attending an official dinner.

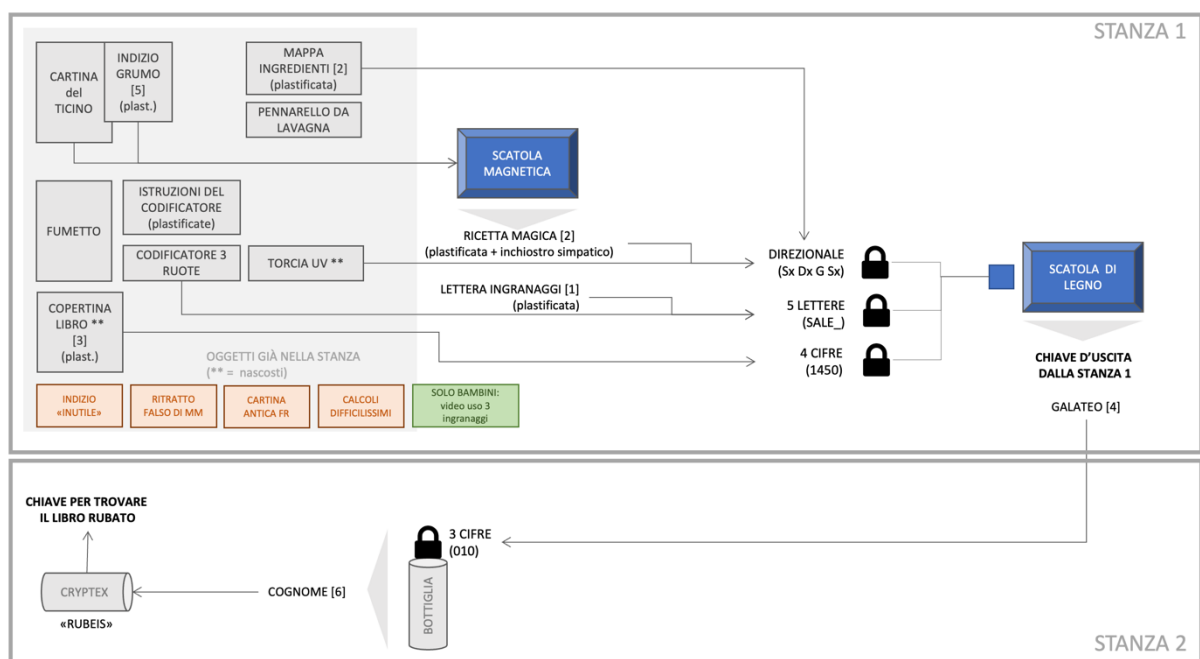
Two ER kits (from BreakOutEdu.com and from MyEscape.ch) were available, along with a few additional elements provided by a local ER company (a magnetic lock box, a battle with padlock cork, a 3-wheel coding system and a few additional locks). Differently from what is usually done, the physical materials of the ER were taken as primary constraints in the design in step 2, i.e., they were presented right away to the pupils and were used to determine the format of solution codes. This decision made the development of puzzles easier, as provided a clear focus to the groups, which had to work on a clearly defined issue like: “develop a puzzle that can be solved by knowing X, and that generates a code of format ABC”.

Pupils created very effective puzzles; the biggest challenge was writing down the ER rules, the hints and the narrative in a formal and clear way. The teacher’s main role in this phase was providing advice and then helping to formalize the pupil’s products. Pupils were also eager to include in the ER some *red herrings*, i.e., false or

misleading hints; for example, some very complex but useless math problems were hung on a wall along with an irrelevant old-looking map of France. The final game flow structure of the ER is illustrated in Figure 4.

**Table 1: Organization the ER design (phase 4)**

| Step | Design element | Goal                                                                                                            | Approach                                                                                                                                                                                |
|------|----------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Learning       | Selecting knowledge items to be learned by the players                                                          | Whole class: review of the comic book<br>Personal annotation of key/important elements<br>Whole class: for selecting knowledge items                                                    |
| 2    | Puzzles        | Developing puzzles related to one knowledge item selected in phase 1                                            | Teacher-defined groups: each group picks one knowledge element and one of the available padlocks.<br><br>Puzzles are tested first with classmates, then with pupils from other classes. |
| 3    | Narrative      | Developing the ER narrative.                                                                                    | Each group proposes one draft narrative. The whole class selects the best one, which is then further developed by the proposing group.                                                  |
| 4    | Game-flow      | Designing the game-flow for the ER, connecting all puzzles                                                      | All puzzles are represented on the blackboard; the expert leads the discussion about how to connect them; a final ER map is drawn.                                                      |
| 5    | Equipment      | Listing all required equipment for the escape room; producing draft materials for puzzles, rules and narrative. | Each group develops the materials for their own puzzle, including hints. Groups that finish earlier make a drawing of how the ER would look like, listing ideas for props.              |



**Figure 4: ER game flow**

Testing is paramount in ER development just like in any game development process (Botturi & Babazadeh, 2022). In this case, puzzle testing was organized in three tiers: (a) already during development, in step 2, puzzles were tested by classmates, using paper-based draft materials; (b) at the end of step2, pupils of other classes were

invited to “open locks”, and they tested the puzzles using the final materials; (c) on the morning of the last day in the project week, groups of pupils from the terminal class were invited to test out the whole ER.

During the third testing phase, the pupils who designed the ER participated in turns, in the role of narrator, presenter of rules, and observers. After each round feedback was collected, and some elements were fine-tuned, especially the ER rules and some hints, which seemed barely understandable. This final testing also gave the opportunity to adjust the time limit.

The output of phase 4 was a fully functional educational ER, with all materials in low quality, as they included basically school-quality copies of printed materials (e.g., the comic and hints), and children-written narrative introduction and game rules.

## 2.5 PHASE 5: Development

The materials produced in phase 4 were passed on to the organizing association Blenio Bellissima, who took care of developing high-quality materials for setting up the actual ER following the children’s indications and drawings. Two elements were largely improved in this phase: the narrative introduction, that was expanded to also integrate the game rules and that was recorded into a video by professional actors; and the written summary of the game rules, that was completed and formatted with a word processor (Figure 5). Reboot instructions for the museum staff were produced.

The escape room was set up in the Casa dei Landfogti as planned (Figures 6 and 7), and a training session for the museum staff was organized, so that they would know how to introduce the ER to players, and how to reboot after each game.

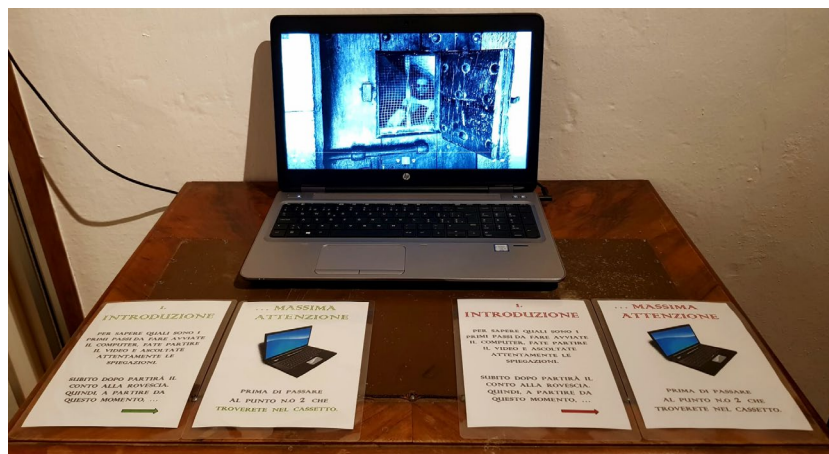


Figure 5: Introduction and rules station of the ER in the hallway



Figure 6: Some of the puzzles in the ER



Figure 7: A Part of the ER set-up in the first room

### 3. Outcomes

After its installation in the ancient local prison, the escape room enjoyed the visit of 125 teams (about 650 players) in 6 months (mid-June to mid-November 2022; the opening months of the museum), including tourists, local families, groups of friends, and 30 school classes, representing a successful example of open school game design project. The short and non-compulsory form of the museum collected extremely positive feedback, and many wondered at learning that the ER was designed by primary school kids. The large proportion of players, including school classes, that came to the ER by word-of-mouth also suggests that it was positively welcomed.

Of course, the pupils who designed the ER were extremely proud of their collective creation. During the debriefing at the end of the project week, they commented on having learned that some results – like the development of a complex game as an ER – could only be reached with the participation of everybody. Collaboration and awareness of its importance were definitely a positive learning achievement for this group.

The ER design project proved a motivating context for working on several disciplinary competences. Pupils had the opportunity to learn the key facts about Maestro Martino (which is part of their History program), to develop formal reasoning in puzzle design, to make a drawing of how the ER would look like, and to write different types of texts, including short hints, the rules, and the introductory narrative.

This project was also an opportunity to introduce game culture: children discovered that games are designed (and do not just “exist”), that some people design games as a job, and that games can be embedded into broader cultural initiatives. Most important of all, they engaged in designing a game geared for learning, and not just fun.

### 4. Conclusions

This paper presented a case study of educational escape room design with a primary school class as a project-based learning experience. The project was coordinated with a local organization embedded in the context of a regional cultural initiative. The previous sections outlined the design process, how school activities interacted with out-of-school and professional development phases, and the project outcomes.

As a case study, the findings of this paper cannot be generalized. Its focus was on a single experience that took place within a specific school (a small institute) and class (grade 3) context in a rural alpine region; it is fair to expect that the same approach in a different situation would require adjustments and possibly yield different results. From a methodological point of view, the case study was not accompanied by structured (quantitative) data collection and analysis.

Nonetheless, I believe it illustrates the power of educational ER design for learning under at least three respects.

First, it proves that even a complex game device as an ER can be designed with kids and suggests some scaffolding ideas to make it manageable. For example, preparing a thorough requirement analysis in advance; clearly delimiting the knowledge items or learning goals to be included in the game; structuring group work; and using material constraints as elements to simplify design decisions.

Second, game design can foster open schools, or creating a bridge between educational institutions and local partners, including cultural associations (like Blenio Bellissima) and companies (like BlockaTI). We believe such interactions are an added value and a relational asset for schools. Moreover, children were engaged in designing an authentic product, and not an output for evaluation – which is fundamental for competence-oriented education. Indeed, the class teacher is already thinking about creating a new ER in collaboration with the local photographic archive.

Finally, this experience supports the claim that games can add value to cultural events. In this case, the escape room contributed to enhance the overall celebration of Maestro Martino, adding a perfectly integrated popular and fashionable element to the celebration, so that many young people and families learned about the cultural events in Valle di Blenio thanks to curiosity for the escape room.

Educational ER should be considered as all-round instructional devices, beyond their use as a specific and effective game-based learning approach. ER have the potential for generating meaningful game design experiences and connecting education and the community. These could be new avenues for research on educational ER to explore.

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