History didactics, board games and cognitive operations

a step forward in the educational use of board games

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Abstract
For decades, board games have been used in educational context to improve the student's emotional involvement and to help them to grow their interests and curiosity. But would a playful learning be enough to achieve a true understanding of a discipline?
Often, they are focused on contents transmission rather than on the development of those cognitive processes, and for this reason they could easily convey data and information that, even so, are lately dismissed and forgotten. Data that aren't supported by adequate conceptual and cognitive/operational structures, are learned but not understood, and for this reason on long terms they are dismissed in favour of more practical and urgent ones.
The evolution of the application of board games to history teaching could indicative of how board games could really help in the development of cognitive procedures, shaping patterns of reasoning that ground the historical thinking.

Keywords
Gamification; board games; primary school; cognitive processes; cognition; history; history didactics, historical thinking.

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https://www.youtube.com/watch?v=frWridTxmLo&t=20s

Formal and informal education

The education provided by schools and universities is defined 'formal', since corresponds to standardised, systematic, structured, and organised models, and is subject to laws and norms that indicate objects, contents, and methodology of the teaching. Oppositely, the concepts, information, data, knowledge developed thanks to out-of-school experiences, such as visiting museums, entering exhibitions, attending theatre dramas, reading novels and comics, watching movies, playing video and board games, are considered 'non-formal' or 'informal' education.[1]

Formal education aims to explicit objectives and to achieve them relies on curricular patterns designed by pedagogists and specialists in disciplinary and general didactics. Oppositely, informal education is less articulate, more occasional, more situational, and frequently chaotic and lacunose. Its tangible and experiential nature determines anyway a higher level of participation and emotional involvement of the learner, especially because often corresponds to personal curiosities or interests.

Games for teaching

Since more than 30 years, board games are among the best solutions for teachers that aim to bring a non-formal experience in their classes, especially at primary school. Most of the gamified activities offered by actual textbooks consist of crosswords, puzzles, modifications of the game of the goose, and quizzes. Since they require the same material that children have in their cases, like pencils, crayons, and rubbers, and demand quite usual actions for a school context like drawing, writing, answering questions, those games look well aligned with the necessities, methods, materials, and objectives of formal education. They are also a 'sustainable' choice for teachers, since do not require special settings for the room or particular teaching approaches, neither a time longer than the lesson, or some kind of preliminary preparation in terms of contents or gaming rules. On the other side, their educational effect is quite low: in fact, they don't diverge so much from a close-ended test and certify just the pupils' mnemonical preparation. Finally, according to students, they aren't even so alluring.

There are also other kinds of educational board games that are more interesting

1 DIB (1988): 300.

in terms of pedagogical approach: simulative board games, that generally convey a simplified representation of a certain reality, whose dynamics are simulated by gaming mechanics. In Italy, at the end of the '80s, teachers grew an interest into this kind of activities described in volumes for teachers' training. Some of those publications included papers of prestigious contributors like the board game designer Alex Randoplh and the board game critics Giampaolo Dossena.[2]

With reference to history teaching, one of the forerunners has been the 'Game of the four feuds'. It represents the Italian feudal system at the beginning of the ninth century.[3] It consisted of four boards representing the feuds, and four groups of students played at their administration: they simulated the tax collection and their possible uses, like building castles, summoning knights, ploughing new lands to entrust at farmers, monasteries, local lords etc. A deck of cards picked one by one at every turn represented the possible events of the period, strengthening the historical setting; and a die brought that little bit of randomness which made the game more exciting. A debriefing followed the match and students analysed the historical aspects of the game in a collective discussion.

Activities of this kind were certainly more appreciate by pupils, being 'true' and amusing board games. In addition, being expressly designed to be played in groups, they also had social and emotional implications. Under every point of view, they consisted of an experience of non-formal education, that the following debriefing connected with the standard and formal education.

Although students' high appreciation, Simulative boardgames proved to be a 'hardly sustainable' choice for teachers since required a deep knowledge of the period and generally weren't materially published, but just 'described' in teachers' guides. Thus, teachers interested into them had to draw the boards and write the cards by themselves and learning a quite complex set of rules. In addition, the playing activity could easily overstep the end of the lesson, deranging the weekly schedule of the courses.

For this reason, in Italy, with the generational turnover of the teachers who experienced the introduction of those games as an unprecedented innovation, and with the evolution of the school programs, simulative board games had been almost completely dismissed.

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2 CECCHINI, INDOVINA (1989).

CECCHINI (1987).

3 CRISMA (1987).

Game invented by Amina Crisma, Alberto Recla e Ivana Savini.

A new instrument for an old didactic approach

This long-term failure, especially at primary school, is partly derived by a misconception about the nature and objectives of history didactics. Today, history is still considered a theoretical discipline whose teaching must focus on contents transmission and no or few efforts have been made to teach children how to gather historical data in systems, how to extract relevant information from primary sources, and how to apply this method of reasoning to everyday life.

Differently from textbooks, which present their contents statically, simulative games turned them into a dynamic representation that allowed active approaches and interactions, but in complex remained focused on contents transmission and their final goal was to make more pleasurable their acquisition.

This could help pupils to improve their affection towards the discipline but didn't really lead to it's better understanding. It would be like teaching Maths as a series of numbers without teaching operations. With a such pedagogical background, in an educational system that is generally going towards a new model of didactics that mix contents and competences, simulative board games resulted an innovative instrument applied to old perspectives.

Teaching history as teaching a method of research

Even though school programs offer the image of history as a huge list of selected and resumed contents that students must memorise, history is a much more articulate discipline and is not merely a list of contents, but also a research method, as implied in the etymology of its name: Ἱστορίαι (Historíai) is derived by the Greek verb ἱστορέω (historéō) that means 'I inquire' and 'I record'. Historical education should concern of course contents, but also the cognitive operations necessary to develop an understanding of their relations and rapports.

Mind the gap

Contents and competences aren't all: to be successful, history education also need another element. The resume offered by textbooks is often well structured and exhaustive, and generally doesn't raise any cognitive, interpretative or documentative problems. Historical thinking requires a certain base of contents, but to be triggered needs also some missing points, a little bit of disorder in the data, an incomplete timeline, some enigmatic or controversial element, and especially pri-

mary sources, that textbooks dramatically lack of. Those small points of incoherence might not be placed in the paragraphs, but in the annexed exercises to solicit the curiosity of the students. In fact, a genuine personal interest is what historical thinking needs to be activated, and this could raise from a documentative curiosity, or from the resolution of an operational issue. The following chapters present a transactional analysis of an educational board game that focus on contents, cognitive skills, and personal motivation, connecting its epistemological background with its implementation in the class.

Disciplinary epistemology and board games: a new perspective

The American pedagogist Jerome Bruner wrote that the aim of school shouldn't be teaching disciplines but put them into practice.[4] He also suggested that education could be more 'personalised' if includes some practical experience that lead to an 'act of discovery':

> «In sum, the very attitudes and activities that characterize 'figuring out' or 'discovering' things for oneself also seems to have the effect of making material more readily accessible in the memory».[5]

In history school textbook, knowledge is 'given' and don't offer so many opportunities for acts of discovery. Probably, for this fact, non-formal education results so charming and students' approach towards history is more affected by videogames and movies rather than textbooks. About the fact that in this disciplinary area cognitive paradigms are largely defined by non-formal education, this might be mainly derived by the absence of methodological indications in history courses, that don't train the cognitive procedures peculiar to historical thinking. According to this perspective, educational board games could point at cognitive operations demanding to find something out, and to solve a cognitive problem in the context of a precise disciplinary framework. This would be a 'gamechanger' in the educational use of board games and would be in between formal and informal education, maybe taking the positive aspects of both.

4 BRUNER (1966): 97.

5 BRUNER (1961): 32.

The shape of thought

One of the major professional challenges for teachers is leading pupils to understand how to connect their formal and informal education so they can successfully influence each other, and the use of gamified activities and educational board games could be useful also for that. Frequently, students acquire pieces of information thanks to their non-formal education, and since it happens through a personal experience, those are deeply rooted in their memory and may be stronger than the theoretical assumptions offered by textbooks. In those cases, an 'act of discovery' may shape unarticulated or fallacious knowledge. Would this knowledge be flexible enough to be corrected in a formal context? Could it include new and controversial information and change in terms of contents and morphology if this further information proves to be right? Could it be related to other forms of knowledge derived by everyday life or by other disciplinary areas?

A group of data preliminarily acquired through a personal and significative experience cannot be erased and could be hardly reorganised, unless by direct choice of the learner. To correct this bias is necessary another experience that bring the student to re-evaluate those preliminary data. This could happen thanks to a new and more accurate set of data, or thanks to a new perspective that charges them of new meanings. In terms of cognition this experience is not relevant for its empiric value since knowledge doesn't derive from its tangible or physical implications but form the acknowledgment that things might be seen in a different perspective. This is finally a pure intellectual act induced by the teacher but felt as 'personal' by the learner, who might consider evolving his or her cognitive schemes and procedures.

This too is what Bruner would call 'an act of discovering', not with reference to the acquisition of information, but in meta-cognitive perspective, with reference to the infrastructure of reasoning. Those kinds of experiences leave a sort of real and 'tangible' memories of emotional and intellectual nature, which may be also more relevant than the sensorial ones in shaping the forms of thought, like the feeling of gratification derived by realising that a process of understanding has been accomplished.

Deeper into cognitive implications: metacognition is the goal

The German philosopher Edmund Husserl described in the same terms the

'phenomenology of reason' in his Logische Untersuchungen,[6] where he states that mental acts can be oriented towards both: empiric and intellectual objects, and that also intellectual acts could be in some way 'experiential', since they can produce a consciousness and a very persistent memory.[7] This process of metacognitive awareness is something that every human experienced, and one of the most iconic examples is reported by Vitruvius, in a passage referred to Archimedes:

> «As this pointed out the way to explain the case in question, without a moment's delay, and transported with joy, he jumped out of the tub and rushed home naked, crying with a loud voice that he had found what he was seeking; for as he ran he shouted repeatedly in Greek, "Εὕρηκα, εὕρηκα"».[8]

The evidential paradigm

Generally, teachers think that, to increase their historical knowledge, students just need more pieces of information. But knowledge isn't finally a list of data, but the comprehension of their correlations, so, just after a process of analysis that put in light their eventual connections, data may be reorganized in that coherent and meaningful system that we call 'knowledge'. What teachers often forget is to provide students with the intellectual instruments they need to connect historical data and develop meaningful interpretations from fragmentary pieces of information. The case of Archimedes is quite eloquent: what he had been seeking wasn't an additional information, but a new perspective to successfully connect all the pieces of information already in his hands. The same process has been described by Carlo Ginzburg, one of the most eminent Italian historians, as the 'evidential paradigm'. This epistemological attitude, peculiar to historical thinking, bring a subject to analyse the affinities of several objects, establishing among them a system of explicative relations and finally advancing hypothesis about the origin of their correlation.[9] This is the procedure applied in the reconstruction of a past event: relying on the traces it left and organising them in a 'system of coherence' where everything

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6 HUSSERL (1900-1901).

7 SCANZIANI, SPINNICI (2016).

The volume consists in the collection of the Husserl's academical lessons of 1904-1905.

8 M. VITRUVIO POLLIO, De architectura, IX, 10.

9 GINZBURG (1979).

Republished with some modifications in:

ECO, SEBEOK (1983) pp 95-136.

GINZBURG (1986).

finds its place, is possible to figure out what happened. The accuracy of this reconstruction depends by the quantity and quality of the historical traces available, and the quality and quantity of the skills of the historian who studies them.

Abductive inferences

The cognitive procedure that ground the resolution of an 'evidential paradigm' was described by the American philosopher Charles Sanders Peirce as 'retroduction', for it requires to speculate on a diachronic plan.[10] This is indeed a mental process that, analising the typology and nature of the correlations of different effects, tries to find out their common cause. Its definition was lately changed by Peirce into 'hypotheses' and, finally, into 'abduction',[11] which remained in use among cognitivists.[12]

Abduction is a particular typology of inference that, differently from 'induction' and 'deduction', starts from an imperfect documentation and insufficient data, and tries to hypothesize how to complete the picture, or how and where to search for further elements. This intellectual procedure doesn't lead at the creation of an indisputable knowledge, but Peirce consider it the first level of the scientific thinking, since is not limited to the observation of facts, but introduces new ideas and interpretations about them.[13] Those might be later proven or dismissed using inductive or deductive reasonings. Finally, through abduction, data are analysed in thematic perspective and trying to find what are they pointing at, sometimes without having any idea of what it could be, helps to define the area of research.

Many board game historians applied this mental procedure when they faced a series of literary, material, and pictorial evidence presumably related to the same board game and had to figure out what sort of game could be, how could it work, which could be its name and its socio-cultural implications. A clear example of the composition of an evidential paradigm is the famous Ulrich Schädler's paper about the Greek game of the Pentegrammai,[14] where is possible to see quite clearly the epistemic operation of the author: he widened as much as possible the evidential paradigm including more elements, so to increase the preciseness of his interpreta-

10 PEIRCE ((ed. Hartshorne, P. Weiss, A. Burks): manuscript 692.

11 PEIRCE (1878).

12 I.e.: CHOMSKY (1979): 71.

13 C.S. PEIRCE (ed. Hartshorne, P. Weiss, A. Burks): 7.218.

14 SCHÄDLER (2007).

tion, and finally tried to answer at the question: "What are those evidence pointing at?"

Concepts and language

The resolution of an evidential paradigm implies an activity of conceptualization that corresponds at the creation of new concepts. Any new conceptual construction needs to be adapted to the linguistic structures of the subject, being shaped by them, but sometimes also modifies them.

The verbalization is the last stage of the cognitive process, that attests the complete acquisition of knowledge. In the early 1920s the German philosopher Ludwig Wittigenstein wrote:

> «Die Grenzen meiner Sprache bedeuten die Grenzen meiner Welt»[15]

meaning that only what can be defined and described by words is really part of our *Weltanschauung*. The implied statement is that enriching our dictionary with new terms and with their conceptual counterparts, brings to a deeper understanding of the reality. A few decades later the psychologist Allan Paivio integrated this idea with his theory of the 'dual coding', stating that human brain can codify information both verbally and non-verbally, and that the verbalization is the last stage of a conceptual elaboration.[16]

Morphology of historical knowledge

This digression on human cognitive activities helps to define the goals of history education which, as previously said, can't be considered just as a mere transmission of information. Teachers should take care of the historical skills of students, helping them to achieve a true comprehension of the discipline. In this perspective, the morphological analysis of the cognitive elements that constitutes the historical knowledge is very useful to understand which skills should be solicited in pupils. Historical knowledge is a system of interconnected historical information, and each of those should be:[17]

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15 WITTIGENSTEIN (1921): 5.6.

The borders of my language are the borders of my world.

16 Paivio wrote a lot about the dual coding theory, the following list is just indicative:

PAIVIO (1971); (1986) ; (2006).

17 This nomenclature, is derived by Italian and French literature, where is possible to find deep analysis of the cognitive operations that ground the historical thinking, and especially:

- **Thematised**: referred to a precise topic, that requires to be named: "what are we talking about?"
- **Temporalized**: must have a chronological indication: "when did it happened?"
- **Spatialised**: must be geographically located: "where did it happened?"
- **Problematised**: should be related to a cognitive problem: "I need to know why it happened?".
- **Explanatory**: should answer at a cognitive problem: "does this explain something or not?".
- **Personal**: should be felt useful on a personal level: "does this influence my perspective on reality?"
- **Communicable**: must be adapted to the learner's linguistic framework or help to shape it: "How do I describe it?"

Historical Information that doesn't fulfil all those requirements are imperfect and generally students consider them useless and forget them immediately after the next school test (especially if it lacks one of the last four elements).

Historical thinking

A true historical knowledge cannot be fully achieved without the development of the historical thinking. This is a complex of intellectual and cognitive operations, each one associated to a different morphological aspect previously mentioned. In example, thematising means to define an area of research and, in the case of primary school students, also to create conceptual categories to identify or define it, starting with the widest and most general ones like 'time', 'space', 'society' and proceeding with more specific and narrow ones like 'century', 'region', 'civilisation'.

Some of those fundamentals of historical thinking are learned at school, like the temporalisation and spatialization, which rely consistently on information provided in formal contexts such as the concepts of BC and AD or standard periodisation like 'Neolithic' or 'Bronze Age'; but also, geographic coordinates and toponyms such as 'Mesopotamia', that are poorly used by pupils in other contexts. Oppositely, competences like the personalisation, problematisation, communication are intensively solicited in non-formal contexts and derived by kind of experi-

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MATTOZZI (1990).

ences other than studying.

Board games to teach how to think

Lizzie Magie's[18] last words were:

> "I am thankful that I have been taught how to think and not what to think".[19]

And this is the point: simulative board games exploit the interactive nature of board games to aim at contents' transmission, using game mechanics to represent historical dynamics, so to show at pupils how some aspect of the period in question were related. The nature and typology of those relations might not be anyway clear to students; also, the finality implied in the educational and gaming aspects of the activity are divergent and might compete for the students' attention. Winning the match doesn't imply the understanding of historical dynamics, and the pursuit of victory might orient the students' attention towards the most effective choices in game, rather than on its historical setting. Briefly, what could be easily trigged using a simulative board game, is the strategical rather than the historical thinking. This introduces in the experience a disruptive element since the activities of playing and collecting data about the past are contemporary but not bounded together and don't have influence on each other. A solution could be the design of educational board games that orient in the same direction contents, gaming mechanics, and cognitive procedures applied in playing.

A gamified course of history

In 2013 the Italian association of history teachers, Clio '92,[20] launched a research program about the use of educational board games and promoted the design of a gamified course of history.

The idea at the base of the project was to exploit the game mechanics not to represent some historical dynamics, but to train the cognitive processes at the base of historical thinking. The design of those activities started with the selection of a cognitive skill that should have been solicited during the gameplay, and then a

18 Macomb, Illinois, 1866 - Arlington, Virginia, 1948. Had been the designer of the original Monopoly board game.

19 PARLETT (2019): 106

20 https://www.clio92.org/

traditional board game that required the same skill was identified and modified with contents taken from the history course.

The aim was to bring students not to play 'at' history, but 'with' history, reducing the distance between them and the discipline eliminating any level of simulation: neither the game should have been a simulative representation of the past, nor students had to act the part of somebody else from themselves.

For the 3rd class, when should be supposedly taught what happened on Earth before the Neolithic, new games have been designed to convey the fundaments of historical thinking; while for the 4th and 5th class, where history courses concerns the antiquity, have been proposed hypothetical reconstructions of ancient board games, which results as both: games and historical sources, full of connections with the social, political, cultural contexts in which they were played.

From 2013 to 2018 the project had been tested in several Italian primary school involving more than 70 teachers and 1200 children; being lately adopted as a doctoral research project at the Faculty of Education of the Free University of Bolzano.[21]

General overview

The project, in its complex, has been designed with reference to three parameters:

- **Teacher**: every activity should be a sustainable teaching option and useful in terms of disciplinary didactics, but also interesting, amusing, and suitable, even for the teachers. For this reason, the materials have been published online in A4 format as PDF files, illustrated with simple black and white drawings and no accessory decoration, so to be fully readable even after being photocopied. Every step of the project has been furnished with video tutorials and all the activities have been expressly designed to be implemented in the class, with no special needs in terms of space, time, and material.
- **Pupils**: every activity consists of a non-formal experience that solicit pupils' curiosity connecting past and present and engages them with cognitive problems which can find answer just after the analysis of primary sources like drawings of bas-reliefs or translations of ancient text. Every

21 https://giochiecivilta.jimdofree.com/games-and-civilisations/

lesson starts with playing a board game, and continue with other kinds of gamified activities, alternating games for groups and couples, so to keep high the students' attention and solicit their social and interactional skills. The groups remain the same for the whole year, so to encourage the participation of their members, and since at every activity corresponds a score, the whole course turns into a History Championship.

- **History Course**: in terms of contents the project follows the standard history curriculum adopted by most of the Italian primary school. Nevertheless, since every activity requires the application of cognitive procedures peculiar to historical thinking such as the evidential paradigm, or the thematization, it also results as a curriculum for the development of historical competences. Along the course increases the level and the quantity of the skills required, and the last activity of every year consists in a gamified test of historical competences. With reference to contents, the project integrates the standard curricula, shedding a light on some aspects which are generally neglected by textbooks like intercultural exchanges and everyday life. The consistent use of primary sources, eventually without any mediation, allows pupils to have a deep sight into the past, but allows them also to develop their own interpretations and mental schemes.

Historical Memory: a sample

One of the activities designed for the 3rd class is the Historical Memory, which consist in a memory game whose cards represent historical facts and events and include a written description.

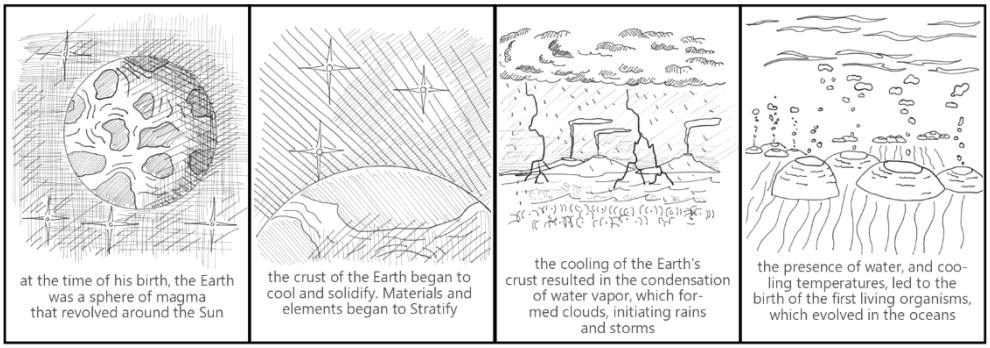


Figure 1.

Children split into four groups at the corners of the class and cut the cards out

from the photocopies and start playing at memory as they used to do at home. Approximatively after one hour, the teacher stops the game and asks at the groups to detect, in their decks of cards, six different sequences of four cards each.



Figure 2.

A speed competition takes place in the class and the teacher is the referee: when a group of students thinks to have completed a sequence asks for a check and the teacher can answer only 'yes' or 'no', specifying how many cards are right and how many are wrong without giving any other indication. If the sequence has been rightly restored, the teacher can confirm it, but the group can receive the correspondent score only when the cards are placed in the right order. This essentiality in the communication is crucial: during the tests we found that when a teacher tried to help some group, its children ceased to be proactive and, instead of developing their own reasonings, shifted to a passive approach and expected to receive operative instructions. When the next hour is about to finish, and with it the whole lesson, the teacher gathers the cards of every sequence and patches them at the blackboard, asking at the class to give them a name.

From disciplinary epistemology to history teaching: analysis of the

game

A game of a such simplicity hides a huge cognitive complexity and multiple methodological implications. At first, starting the lesson with a playful moment induces children to adopt the same cognitive attitude of a non-formal context. For this reason, is very important for the teacher to let them play, avoiding reminding that they are at school. Also, playing a game has recreational effects on pupils and starting a lesson in this way makes them more proactive.

The second half of the lesson reproduce the debriefing that some years ago followed the simulative games and whose aim was to analyse the gaming experience linking it to the patterns of formal education. In this case pupils still engage in a process of contents analysis, but this turns into another game and doesn't focus on contents as much as on the identification of their relation. The historical information is indeed already included in the previous memory game, children simply didn't notice them because their attention was focused elsewhere. In this way have been also separated the moment of play and the moment of cognition: when pupils play at memory, they focus on winning the game and when they search for the sequences, they are free to direct their full attention to this task.

With reference to the fundamentals of historical thinking, or to the morphological aspects of historical knowledge, this activity is completely devoted to the process of thematization: by selecting the cards and composing a tentative sequence, children figure out their topic and connect with other cards that seems related to the same argument.

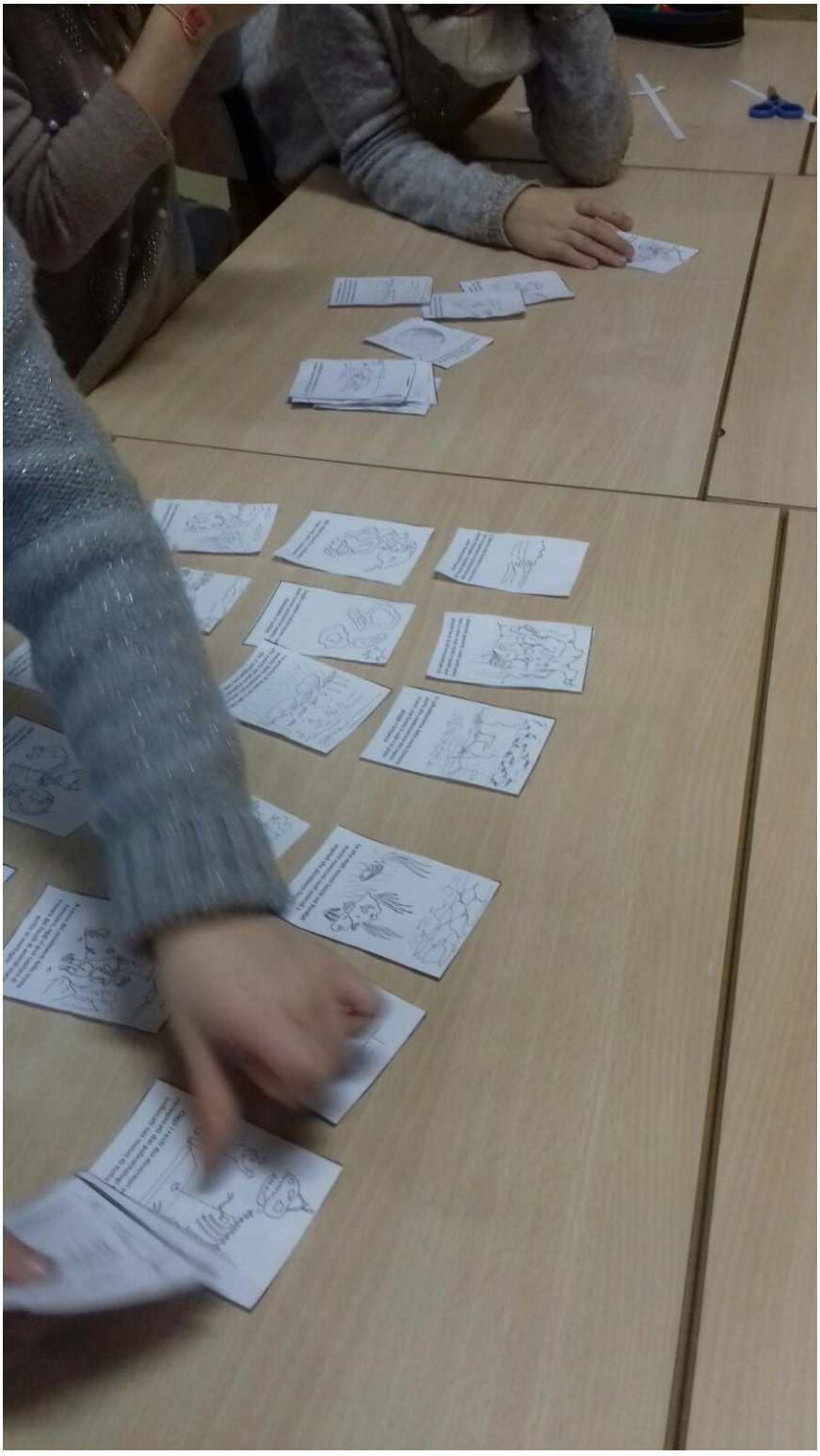


Figure 3.

In fact, thematising means to collect all the elements that seems to show a thematic pertinence, as they look referrable to the same: subject, period, place, or that are characterised by the occurrence of the same action, or by different actions that developed with the same modality or for the same reason. So, the core of a process of thematization is the ability to detect some aspects of pertinence, similarity, or identity in different elements. For this reason, the lesson starts playing at memory, since it's a game based on the ability to recognize a visual identity, which is a skill that children should master completely within the end of the second year of life. This is indeed the prerequisite of playing memory and the mnemonical implication of the game comes just after. Since the identification of a visual similarity is a cognitive process overmastered by almost everyone, we ceased to recognise it: it's still present but simply pass unnoticed because of its excessive intellectual simpleness.

So, this gamified lesson introduces a cognitive process approaching it at a level that children master completely and lately escalates it to more complex levels: from visual identity to thematical affinity. During the second phase of the lesson children must recognize, at first, that the picture and the description on a card are part of the same information and, hopefully, they should start to define it even just by intuition or, as Peirce would say, by abduction. They start to hypothesize the possible topic and lately, in the search of the other cards of the sequence, they put their interpretation on a trail: would it find correspondence in other cards or not? This is exactly what Ginzburg defined as 'an evidential paradigm', in which several pieces of information may gain an explicative value thanks to an interpretative activity that correctly identify their connections and place each of them in the right position. Of course, this would require several attempts.

The Swiss pedagogist Jean Piaget identified four different stages of the cognitive development and considered essential for the child to have the possibility to commit errors, since even in our childhood all our theories and hypothesis are based on trial-and-error processes.[22] Usually, at school, we have been taught procedures to do things properly, but even if this pedagogical approach seems to ensure a certain degree of effectiveness, it avoid for the student the possibility to think effectively according to their minds, since omit the possibility to try and learn from errors derived by personal interpretations and not by deviation from the standard practice. In this game pupils are free to explore several hypotheses

22 The theory of the four stages of cognitive development is widely treated in several Piaget's publications. For a quick overview about his works:

PIAGET (eds. H.E. Gruber, J.J. Voneche) (1977).

without preventively censoring themselves and since they aren't provided with a procedure to put cards in order, must figure it out by themselves. This is a true act of discovery, not referred to data, but with reference to mental procedures, and playing in group helps a lot.

To increase pupils' curiosity, has been included also sequences on arguments unknown to them, generally bypassed by textbooks like the cooling of Heart and the origin of carbon, or very far ahead like the ice age. Despite of this fact, children usually manage to successfully identify those sequences partly figuring them out and partly relying on knowledge derived by their non-formal education (i.e., the successful Ice Age series of movies).

With reference to modern historiographic perspectives, has been decided to represent in this game not events, but historical processes. Studying history as a sequence of events imply a mnemonic approach, while studying history as a series of processes is much more effective: a process presuppose a complex of interactions among its elements. So, each card, and consequently every sequence, represent a historical process.

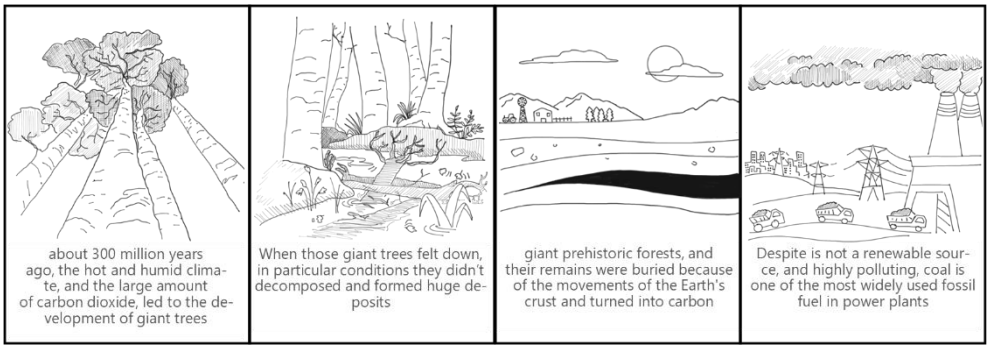


Figure 4.

To help students to develop the right idea of history, as a bound that link past and present, several of the processes represented show also their actual issues, suggesting at pupils that the past is still 'present'. For the same purpose, different cards represent humans that interact with primary sources, finding, handling, reconstructing, or speculating on something. In fact, since primary school should be taught that history is not 'given', but 'researched'. Also, to be sure that the composition of the sequences can't be accomplished just after a visual analysis, some disturbing elements have been included in the visual aspect of the game, like the fossils that recurs in different sequences or disruptive elements that seems to break a visual coherence with the rest of the group.

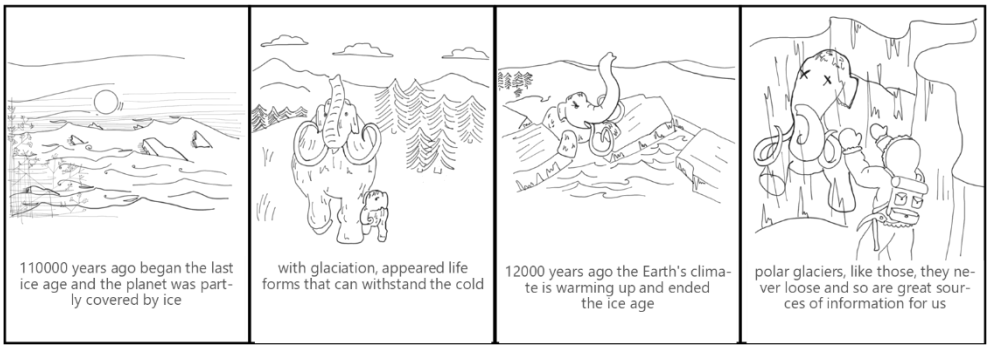


Figure 5.

Finally, after having composed all the sequences, the class gather around the blackboard to give a name at each of them and this is the last passage of a process of thematization: naming a concept means to have personalized it, to have adapted its comprehension to own and personal conceptual and linguistic categories.

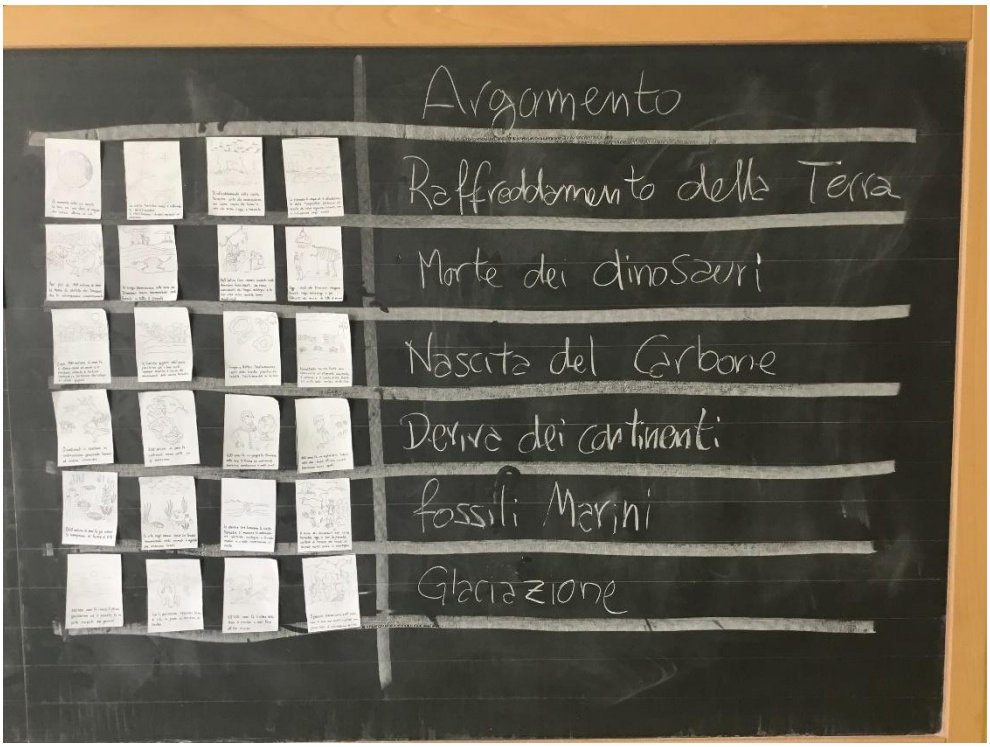


Figure 6.

So, the pedagogical framework of this game is quite complex, nevertheless, children always respond excellently in terms of emotional and cognitive involvement, solving this group of enigmatic sequences in a few dozens of minutes. Some pictures taken in the classes is useful for teacher's training courses when, after having played this game with teachers and professors, they don't think possible that

groups of 8 years old children could solve them. Sometimes the timing of the teachers is also worse than the one scored by some groups of students, and this is quite indicative about what we lost, in terms of reasoning flexibility, to old teaching approaches that focused on contents and operational procedures and not on cognitive schemes and processes. Again, what board games would help with is to teach not 'what to think' but 'how to think'.

Final remarks about the project

All the materials of the described project have been tested in Italian primary school since the end of 2019. The outbreak of the pandemic affected the possibility to collect significative data about their effectiveness and the teachers involved in the data collection managed to send just a few reports, that are anyway positive and encouraging.

Despite this issue that affected the possibility to develop a scientific evaluation of this methodological approach, it seems that the model of gamification conveyed by the project has been widely appreciated by teachers for its operational sustainability and its disciplinary efficiency, leading some of them also to change their perspectives about history teaching.

The idea to use board games to solicit primarily cognitive processes, and just secondarily data acquisition, has also been approved and accepted.

Some also appreciated the use of ancient board games as curious objects full of interdisciplinary (like with mathematics) and intercultural implications: the history of mankind could indeed be studied through the perspective of board games.

The materials here described, as well as the teachers' comments, are freely available on the website https://giochiecivilta.jimdofree.com/games-and-civilisations/.

Conclusions

In this paper has been presented an innovative application of board games to teaching, with reference to history didactics. In fact, the same approach, with its cognitive and methodological implications, can be easily applied to other disciplinary fields. So, the use of board games at school won't be just a way to encourage the students' participation at the lesson, but also an instrument to help them in achieving a deeper understanding of a discipline and a higher metacognitive con-

sciousness.

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