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Game: Experience as an Educational Tool

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Abstract

With a rapid growth of information and new discoveries, curricula at schools have been massively overloaded in recent years. At the same time, modern technologies, which have accelerated the learning process in many ways, cause a lack of learning through our own experience. A solution to this state can be a game as a means of linking formal and informal learning. The use of a game might be diverse: gamification of a class with simple gaming activities folded into a game story using a scoring system, comprehensive educational games based on role-playing, or using an ICT game as a tool for recognition of the area of student's interest, a tool for asking new questions, and a tool for offering the desired experience. With regard to the knowledge we have about the learning process, it is clear that experience is still the most effective way of learning, with long-lasting sustainability. So, if we offer experience in an appropriate way, we can make the entire learning and educational process more effective.

Keywords: science, education, gamification, game-based learning, eduLARP game

1. Introduction

Game—what is it? A game may take many forms and, therefore, many different definitions. A game has been a part of human culture since time immemorial, and in terms of phylogeny, it has undergone transformations of form, purpose, and style and defined the cultures. Similarly, from the point of view of ontogenesis, a game is closely linked to the child's early age as one of the most basic ways of learning. Although the game gradually changes with adolescence, it accompanies us throughout our lives and has an irreplaceable role. Many researchers have dealt with the role of a game and its importance in human life.

2. Concept of a game

Johan Huizinga, a Dutch historian and cultural theorist, highlighted the concept of a playing man in the work *Homo Ludens* [1]. He defined a game as a voluntary activity that is performed within a fixed time and space boundaries, voluntarily accepted but with unconditionally binding rules that have a goal in themselves and accompanied by a sense of tension and joy and consciousness of “another being” than “everyday life”.

Roger Caillois, a French intellectual, literary criticist, sociologist, writer, and philosopher who also focused on games, in his book *Man, Play and Games* [2],

defined four principles of a game, which are also four principles that organise cultural life (alea, agon, mimicry, and ilinx). According to Caillois, a game is free—no one forces us to play. Furthermore, it is always separated from everyday life, it is limited by time, and because of everyday life, it represents a special time when something else happens, where different rules apply and when, for example, aggression can be discharged with impunity. A game is not productive either—there is nothing in it, even gambling is unproductive, the values in them only circulate in the circle of players, but they do not arise. A game is subordinate to the rules and, finally, it is fictitious.

To put it simply, we will understand a game as a formal rule-based system in which the player makes an effort to influence the outcome. Because the definition of the game is very universal, it is understandable that there are a number of game classifications and different game typologies. Some sources divide the game into almost 80 categories by number of players, relation between the game and player and between the game and the outside world, or with regard to the fact whether the game is competitive, strategic, sports, computer, social, etc. In most cases, it is not important to specifically classify a game, and it often happens that a game overlaps several categories; therefore, we will not deal with it.

Besides the fact that a game is absolutely natural to us, we often have several other reasons to enjoy it. Sometimes we just need to completely clear our mind to allow our brain to refresh itself and recalibrate all of its functions (we look for simple routine games, often sports games), or we need to escape the everyday reality and we want to be someone else (we look for RPG games or strategy games), we want company or we want to be alone (looking for collective games or single-player games), etc. A game will also allow us to experience a story virtually, to try out other roles, to restructure social hierarchy. Many of today's games will give us space to participate in the process of creating the story. We can test what it would be like to “do something” with the knowledge of safety that our action will not have consequences. The main rule of every game is what happens in the game stays in the game environment, with no real consequences.

3. Learning, memory, and education

The vital importance of learning is that it enables living organisms to adapt to changing conditions of the material and social environment. All living organisms learn, from the first to the last day of life, in all environments (in different ways and things). Human learning is a relatively permanent change in a person's knowledge or behaviour due to experience [3, 4].

The concept of learning in psychology refers to the process in which changes in behaviour, mental, and personality occur in a person, through new knowledge, new skills, and mainly through experience. As a result of the learning process at the psychological level, there are not only newly acquired information, opinions, and new patterns of behaviour but also changes in emotional experience, changes in cognitive processes (e.g., in the way of perception and thinking), changes in personality traits (e.g., self-concept, motivation, moral qualities, abilities, skills, etc.), and changes in relationships with other people. Changes that occur during the life of a person in his/her psyche, personality, and behaviour are the results of the simultaneous action of both major development processes: biological maturation and learning. Moreover, maturation and learning are a dialectical relationship, interacting and conditioning each other [3–9].

Memory processes, as one of the cognitive processes, are often divided into three phases: encoding, storage, and retrieval. During storage, the brain does not store

the received information in the same way (even the same kind of information). The way it is stored is likely to be determined by the type of information and its importance to the individual's life. The importance of information is probably judged by the brain according to the following:

- Attention that is given to information and interest that the information has generated. We pay more attention to information that is vital or of great interest to us.
- Emotional reaction that has been activated by information. More attention is given to information that impresses our emotions and is considered more important.
- Repetition, frequency of occurrence of information (or activity).

These findings can be used to increase the learning efficiency by deliberately inducing attention, emotional engagement, and repetition [4, 6–9].

Education is usually defined as the process of receiving or giving systematic instruction, especially at a school or university. Although education and learning are closely intertwined, the basic difference is that while learning is about the person itself, education is connected with other people—usually a teacher and a learner are needed. Any scientific approach we tend to, we can say that education has always been and will always be the synthesis of several entities—school, family, institution of informal education, and society as well. By formal education, we mean a systematic intentional way provided by a trained teacher. Informal education is the part outside the formal education and is realised in a family, peer group, by mass media, and by institution of informal education (museum, library, science centre, etc.) [10].

4. Digital generation and experience

People learn unconsciously through work, art, language, culture, and experience. The whole communication between human beings is educational. However, it should be pointed out that while in the first half of the twentieth century, learning by experience was part of everyday life—children had to engage in everyday activities around the house and in the garden—nowadays the situation is completely different, maybe scary. The so-called X generation has encountered the coming of digital technology. This technological advancement has greatly simplified people's everyday lives—many activities no longer have to be done, and thus they have not been taught anymore. Consequently the next generations, such as Y and Z, usually have no chance to learn these activities, from home after all. In parallel, the rules of some school activities have been tightened for safety reasons, especially the ones that are connected with getting experience. For example, there has been a decrease in experiments in chemistry lessons, technical work has been abolished in the school curriculum, the rules for teaching outside the school building have been restricted, etc. Everything needs to be fast, clean, and safe. The increasing age of mothers (as well as the first-time mothers) also contributed to the fact that we consider the best option when the child does nothing and goes nowhere (to avoid danger and to be safe). Safety at first: better than to risk is to do nothing. But how will the children get experience?

On the other hand, with the increase in scientific knowledge across all areas, the curriculum has become overfilled. Teachers are forced to teach quantity instead

of quality in school, especially in the case of natural science subjects. There is no time for discussion, no time for experiments, and no time for explanation. And as the consequence of these changes, currently, there is no room for gaining experience. Children's natural desire to discover new things is not developed and is not supported. If there is no possibility at school, it is necessary to take advantage of afternoon time, and if we want to ensure safety, we can do it in a controlled way. So the children's free is a space for a game as a tool to offer experience, especially space for an educational game as a tool to offer controlled and safe activity with experience and educational context.

5. Educational game

Each game carries some lesson learned and shapes us somehow. A game that is explicitly designed for educational purposes is called an educational game. Usually, the goal of an educational game is to help understand concepts, learn domain knowledge, and develop problem-solving skills by playing a game. If a game is used to enhance the learning experience, we talk about game-based learning. Sometimes, we use game elements in a non-game situation—it is called gamification (e.g., corporate reward programmes based on a scoring system).

There are many games that are used at schools as a means of strengthening relationships, motor skills, and ideas or functioning in the classroom. In our context, an educational game represents a game that educates a pupil in a concrete topic or topics, usually concerning science subjects. Unlike general games, where the most important factor is a high positive emotional experience, educational games are mainly focused on the range of information offered. But we have to be careful; sometimes, in an effort to get the most educational content into a game, we offer something called a “game” but not attractive to the player. In fact, if a game is well prepared, the player should not even feel that he/she is being educated.

5.1 Review

Although the game has been accompanying us since the beginning of civilization, at the turn of the millennium, thanks to the incredibly fast development of technology, a game has come to the spotlights of scientists from many areas. Moreover, the facts on youth's consumption of digital games as well as the statistics on how much time youth spend playing digital games cause that the vast majority of studies concern digital games. Digital games are studied as a tool with a concrete purpose and goal, especially by computer designers, psychologists and neurologists, and last but not least, by educators and teachers. The main reason for starting the study of a game as an educational tool in parallel with the growth of technology was the crisis of the paradigms and educational models at the end of the twentieth century. With many benefits and high effectiveness, serious games have become a new educational paradigm. Game-based learning, together with inquiry-based learning, is currently one of the most studied teaching methods [11, 12]. Whitton [13] provides an overview of the field of digital games and learning from a cross-disciplinary perspective and describes games as active learning environments, as motivational tools, as playgrounds, as well as games as learning technology. The link between the videogames and learning, including game design, game culture, and games as a tool for teaching and learning, is described in [14] by the most influential personalities in the field. Opinions on the potential benefits of gaming on students' academic achievements, motivation, and skills in science courses are compared in review [15] to investigate the effects of using educational computer

games in teaching science at the elementary education level. The state of research on the so-called role-playing games across disciplines, cultures, and media offers, for example, [16], and some concrete experience can be found in [17].

Apart from the research work, a number of web environments deal with this topic. Digital educational games for different age groups of pupils categorised by topic and curriculum can be found there for free download. Their quality varies, and it is good to carefully check the game first—scientifically and didactically—and also the game process itself. Unfortunately, they usually do not contain information for teachers about how and when to use the game, how to proceed the final analysis of achieved learning objectives, etc. There are also professional educational games, such as Minecraft: Education Edition ([18], based on the commercially successful Minecraft game). These kinds of games are of higher quality and offer methodology for teachers but are not free.

5.2 Theatre play in education

The first and the most used games in education (from the point of phylogeny as well as the ontogenesis) is role-playing, a type of mimicry game, where we play someone else. It is understandable because imitating someone and playing something are a natural part of learning. Depending on the depth of identification, role-playing has several levels—from simulation, through alternation to characterisation. Sometimes, theatre plays are denoted as role-playing games. However, it is important to realise that it depends on the extent to which the character's behaviour, speaking, and storyline are predetermined. In any case, theatre plays have played an important role in education. In this context, it is necessary to mention John Amos Comenius as one of the greatest philosophers who highlighted the potential of theatre game in the teaching process. Playing in the form of theatre was emphasised in his book *Schola Ludus* (School by Play, in 1630). Comenius used and explored the scenic play as a means of a teaching tool; he defined the didactic theatre play and included it in his own education system. He was not the first who introduced the theatre to schools; the roots date back to the fifteenth century (Roman Academy) [19]. Although it was very progressive to play theatre in the classroom, *Schola Ludus* was merely a means of rehearsing and repeating the encyclopaedic, knowledge-based material, and even where there was room for dramatisation, it was not applied. So he did not perceive a game in the present sense—as a free and creative activity.

5.3 Live action role-playing

In the second half of the twentieth century, the role-playing method began to diverge from passive imitation and staging of prescribed scenarios to be more about the role itself in interacting with others. Gradually, theatrical performance, which had its audience, started to be “live action” role-play (the so-called LARP), which is played for the purpose of the experience of the players themselves without audience. There is no prescribed scenario; the story is shaped by individual interaction roles and, therefore, develops differently within the set rules. LARP is usually performed in an authentic environment; actors have costumes, scenery, and predetermined rules. Naturally,LARPs appeared before they were scientifically defined—for example, oldies party, reconstruction of famous events (Napoleonic Wars, American Civil War), or various fans' meetings inspired by successful books or films, such as Harry Potter Star Wars, etc. LARP has proven to be also a method suitable as a team-building activity in the form of the so-called escape games. The idea of using a LARP game in the education process is eduLARP. The primary target

of eduLARP is to teach students something new. EduLARP includes social interactions between pupils and interaction with the environment, too. Playing roles will allow game participants to do things they would not normally do (due to familiar conventions, fear, or little self-confidence). That is why eduLARP can develop soft skills as a secondary goal. Additionally, the location of the topic of eduLARP in space and time offers a wide range of inter-subject linkages. Lots of eduLARPs are focused on history or science subjects like chemistry, physics, biology, etc.

Although there exist schools that have a whole school curriculum based on eduLARP (e.g. Østerskov Efterskole, [20]), probably it cannot be applied to the majority of schools. However, there is a great potential precisely in the possibility of spontaneous interconnection of formal and non-formal education and the use of free afternoon time of pupils, because even one interesting game can start to evoke interest in seeking answers. The research shows that eduLARPs are very popular and really work in educational sense [21, 22].

5.4 Science education games

In the context of a game in natural science subjects, it is welcome to use a game in every situation where possible—from small, simple games in the lessons, to complex gamification of the classroom. By using a good game, we are able to target the increase of attention, evoke emotion, or ensure repetition and moreover, consequently, ensure that information is necessary to be stored and saved in our brain.

There are several most used kinds of games in the educational process. The first ones are short, fast, and easy games, usually used at the beginning of the lesson as a start-up game (recall of the topic). However, they are not too emotionally charged, and, therefore, the effect of these games is more in the deepening of the importance of the information for our brain by frequent repetition of the activity. They can also be used in students' free time, but for their unattractiveness they are not much sought after.

Role-playing games are more action-packed and more emotional for pupils. They bring better educational effect, and stronger emotional engagement in the game will make it easier to remember the experience. However, their preparation and implementation are very demanding both financially and in time. Schools mostly use the offer of institutions of informal education [23]. These games are very popular, but they are one-time. Often, the initial enthusiasm fades away, and the educational benefit is not further developed.

Therefore, year-round games are now being developed through gamification of the classroom, based on role-playing. By meaningfully implementing short games and sub-activities into a story that runs throughout the school year, and by using a scoring system, we can motivate pupils to be active the whole year. As part of the story, pupils have to face the challenges, and by solving them they get points that move them forward in the story. The benefit is also that pupils do most of these partial activities in the afternoon, combining them with a discussion at school. The teacher does not have to spend too much time by playing the game at school. It is enough to inspire the children to play the game in their free time and to confront the success and result of the game in the class with the teacher and classmates.

6. Design of an educational game

6.1 Features of an educational game

It is absolutely crucial for the educational effect that a review analysis follows the game. It means discussing with the pupils the progress of the game, key moments, and

feelings of the game. As part of this discussion, the teacher explains the educational passages—the students' approaches of solving are compared, or the teacher can show other solutions. By discussing how and why a player has decided in a given way and what the decision has led to, we gain more experience. We can compare our point of view with the views of other players, often realising that we missed some information in the game and our opinion was wrong. Often, the game gives us a chance to introduce some other, secondary topics that could be in the interest of the players and raise new questions. In the framework of the review analysis, there is also room for discussing these open questions. The teacher can encourage pupils to focus on some new topics, show them why these topics are interesting, and guide them on how and where they can get more information. Finally, the most important thing is to tell the students what was real and what was fiction in the game. Of course, the learning goal is carried out by the game itself, but its effect may be increased several times by the final review analysis.

The second thing, but not less important, is that phenomena and processes must work in the game the same way as they do in real life. Or at least they should work by the same way as they are in the model explained in the corresponding curriculum. Different or general models can then be discussed in the review analysis. The teacher can explain to the pupils what other phenomena affect the process.

For example, in one-escape game, themed on a sinking ship's escape, the first announcement to the players was that the key from the emergency exit door was hidden carefully. The aim of the game was then to find, through the sequence of indications, the safe in which the key was stored and the combination of numbers to open the lock. The game was pretty well done except for the basic one—a big mistake. Everybody knows that an emergency exit must be always clearly marked—it is a way to save life. So why should the key be hidden? Then, if the players were not successful in the first few steps, they stopped to be interested in the game because, quite understandable, they felt it as stupid.

It is important for players to be able to draw on their own experience. The game teaches us to adapt to another environment and teaches us how to make the right decisions. It is implemented through showing us what reaction our action will cause. By monitoring the consequences of our activity, we can then improve and accelerate our decisions. However, if the game behaves differently than our experience shows, it will cause confusion in our thinking.

In some cases, the game may be placed in a fictitious environment where some mechanisms work differently. In this case, it must be clearly explained and justified to the players in advance.

Because, as already said, individual's learning is closely linked to biological maturation, it is very important that the game be played by an individual of the age group for which the game was designed. Moreover, in an educational game, we directly follow the curriculum for the target group, and we know in advance what the player already knows and what we want to teach them.

Even a perfect game, if played at a disproportionate age, can have a negative influence, because the child did not sufficiently mature for the game. Not only the game can be difficult or incomprehensible to them, but the emotional experience may not be correctly absorbed and understood. Therefore, it is really important to choose games carefully and follow the target group the game is intended for.

6.2 Form of the game

There is a wide range of different games in offer. If we want to use a game in education, we have two options—to use existing games or to create something of our own. The advantage of the first option is definitely timesaving and high quality if we choose good games. The disadvantage is that it is very difficult to orientate in

the game offer, and it is not always easy to choose the game for the purpose we need. On a didactic platform, discussions about which games are suitable for educational purposes are often restricted to two basic questions:

- The first is whether to select digital/computer games or non-digital/non-computer games.
- And the second, whether individual/single-player games, multiplayer games, or team games are more appropriate.

Discussions on the first question are diverse—from the opinion that computer games are best to the opinion that they are completely inappropriate. It must be emphasised that we live in the digital era and whether we like it or not, digital technologies have become part of everything we do. So targeted repression of digital games is not good. It is also important to realise that every game, whether computer or non-computer, has both positives and negatives. Usually, computer games allow you to play anywhere, anytime. It offers us the opportunity to communicate online with anyone in the world, giving us the possibility of distant friendships with people of the same interests. It also offers to play with a different identity in an impersonal collective, i.e., without prejudice. But even though the game is well graphically processed and accompanied by sound, the experience is not as strong as when a player is in a real environment, where they also feel touch, fear, delight, coldness, etc. On the contrary, games, where real face-to-face contact of the player takes place, are better from the point of improving social behaviour. They build more personal relationships, players do not tend to behave too extremely, and experiences (especially social) are more felt. This approach of a game also transfers the existing relationships between the classmates to the game. This fact can have a positive as well as a negative effect. Sometimes, it happens that pupils who are rivals in real life are unable to cooperate in the game, or at least they try to take revenge on each other during the game.

Comparing the advantages and disadvantages of a computer and non-computer game, the best solution is to combine both approaches. In a face-to-face contact-based game, digital technology passages should be implemented.

The answer to whether individual or team games, single-player or multiplayer (cooperating or competing) games, are more appropriate is analogous. Both types have their advantages and disadvantages, and it is good to combine both. The advantage of individual or single-player games is that the player does not depend on the time possibilities of others. Furthermore, the game results uniquely reflect the pupil's competences, and the teacher sees how the student has improved within their own knowledge and skills.

Team games, in addition to strengthening relationships between pupils, reflect real life. We are usually dependent on someone and forced to cooperate. Moreover, if a game is well designed, everyone can offer their own skills to the team. In team, there is a place for making use of the talent and abilities of each student to its full extent and in the field which is dominant for each student. If each student can offer the best and will see that it is valuable for the whole team, the game will be interesting for everyone.

This case opens the question about the division of students into teams. It can be based on their friendships or determined by the teacher. The first case is more natural, but the teams may be unbalanced in the sense of knowledge and skills. In the second case, it could happen that students in the team will not cooperate.

In gamification, the model of alternating individual work and teamwork is often used.

7. Our experience with preparing games

7.1 Study modules: creative science

The first educational activities, based on some kind of a game and focused on bringing in real experience, were started to be offered in 2009 as part of educational programmes in the science centre—The World of Technology Ostrava [24]. We realised the Inventor class under the licence of the Netherlands Kids and Science Foundation, and, at the same time, we started to design the study modules of creative science. Creative science is a 3-hour module for pupils focused on creative production of various devices, physical or mathematical “toys”, from commonly available materials which can be tried either at home or at school [25, 26].

7.2 EduLARPs

Our experience with the first eduLARP began in 2013. We offered the eduLARP game *Odysea Holy*, focused on inorganic chemistry, for students aged 15–18, in the form of one-day activity for schools. The game was provided at the science centre and was guided by specially trained animators who formed part of the story. Initially, it was only a pilot programme, but from the first moment eduLARPs were already in great demand. Currently, there are three eduLARP games in offer, played in the science centre.

In view of the great interest, there was an idea of creating an eduLARP game that could be played in schools without the need of animators, guided only by teachers, based on a pre-studied game scenario and accompanying methodology. Therefore, in 2017, we started to develop eduLARP games that could be downloaded, pre-studied, and played at any school without the assistance of an external subject. Part of the game description is a methodology for teachers and animators, apps to download if used, animations, presentations, and all the necessary materials in a printable format. There are four games designed for 10–15-year-old students, and the primary educational content is mathematical, with other science subjects appearing secondarily. The games were created in cooperation with LARPists (designers and players of general LARP games) and scientific experts, didactics, and methodologists, who ensured the correctness and adequacy of the educational content. These games are also available for download in the English language [27].

7.3 Gamification of a classroom

In parallel with LARPs, in 2016, we started to work on the creation of a year-round game focused on natural sciences. The game is implemented through the gamification of a classroom, using the scoring system. It is designed for lower secondary school students (ISCED 2A), and the science curriculum is intermingled by mathematics. The main storyline has been prepared, and partial activities have been designed, which we also wanted to connect with the region—information about the history of the town and information about various cultural attractions are also included.

A great advantage of this year-round game is also the fact that it is possible to incorporate there what ordinary life no longer offers, or what we do not want to accept much in everyday life. A typical example is patience—today’s generation is already used to having everything right now. However, many things cannot be rushed, and we often need to teach children to be patient. These requirements can be incorporated into the year-round game by including activities that cannot be accelerated in time. For example, in our year-round game, one challenge is that the

pupil gets three seeds of an unknown plant during the game and the next indicia can be an exchange for a grown-up plant. Therefore, they must try to successfully cultivate at least one of the three seeds. This process cannot be accelerated, and if it fails, they must try to get new seeds passing the side storyline.

Some partial activities have been already pilot-verified and are now being finalised with the design of the whole game. Subsequently, it will be necessary to pilot the whole game and modify the disputed parts.

7.4 Game as a recognition tool

All of the above-mentioned games were primarily designed as non-computer, face-to-face games, with digital technology only as a sub-tool used in the game (most often apps for some specific tasks). For school children, we considered contact games more appropriate. A disadvantage which we have not mentioned yet is that after playing the game, it is difficult to return to the passages or key moments of the game, even during the subsequent review analysis. Sometimes pupils disagree with each other how certain events have gone—and it is not possible to find the truth, because the game is not recorded. It may not be important for the effect of the game itself, but it could be helpful for the teacher who wants to understand the behaviour and the way of deciding by individual pupils. This, on the other hand, is completely unproblematic for computer games, because data can be easily loaded and saved. With regard to the fact that inclusion in education is currently being applied at schools, there is an issue that teachers are not able to identify individual pupils' needs and identification tools are relatively lengthy with often vague results. We have started to think about the possibility of using the game to find out something about the way of students' thinking. The most problematic is the identification of gifted and twice-exceptional students (i.e., gifted children who give evidence of one or more disabilities—like SpLD, ADHD, speech and language disorder, etc.).

We are interested only in natural science talent (not a sport, art, and music talent), so we are focused on skills like decision-making, problem-solving, logical thinking, strategic thinking, and creativity. We are working on a design of the game that could be the tool for the nomination of gifted pupils. Such a game could help the teacher better understand pupil's thoughts and realise that, for example, a seemingly disobedient pupil could be talented and looks like undisciplined because of being bored in the class. Through the game, we will be able to find out the area of interest of students, and we can offer the players to develop and improve their knowledge.

8. Conclusion

Free time of children, which was once naturally filled with learning through experience, is becoming unused. Nowadays, afternoon free time is mostly filled by a game (in majority by a computer/digital game), chosen by the child, often based on marketing pressures or from the point of popularity and attractiveness. Gradually, it will become increasingly important to use children's afternoon time more functionally for educational purposes, and it will be necessary to start offering them experiences that the present time does not allow to experience naturally. A well-chosen game, adequate to the age of the player, can use this time to bring not only fun and relaxation but also learning and improving knowledge and skills. A game can also become a teachers' tool to better understand their pupils' thoughts and decision-making processes, a tool for the nomination of talented pupils, and a tool for specifying pupils' areas of interest.

Currently we want to orientate further research on developing a digital game that would get us more information about the process of thinking and solving natural science problems of primary and lower secondary school pupils. In cooperation with psychologists and sociologists, we are designing the definite structure of the game, a sequence of changing states and embedded narrative elements and discussing a possibility of emergent story elements, partial tasks and questions, and optional help in the game so that we will be able to recognise the strategy of each pupil and her/his preferences from the data obtained by playing.

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