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How do educational Escape Rooms help in improving Soft Skills?

Introduction

The need for a knowledge-based society and the expectations of employers generate the need for highly educated young people with diverse skills and competencies that can be directly applied in practice to enter the labour market. In addition to the cognitive skill gap, we face the problem of people with non-cognitive skill gaps (Casner-Lotto & Barrington, 2006). The main reasons for the growing demand for soft skills are related to the nature of technological development on the one hand and urbanization on the other, which is increasing the demand for personal, cultural services. So, there is a growing need for networking, collaboration, a flexible, innovative workforce, emotional intelligence, imagination, empathy, and openness. These skills cannot (yet) be produced by automation and artificial intelligence.

The field of education is under pressure like never before. The aim is to prepare students for new ways to participate productively in the labour market. Together, the dual power of globalization and rapid technological development is transforming the needs of employers. In recent years, new conditions have emerged for those entering the job. These conditions apply to soft skills. These include competencies that make it easier for graduates to find employment. Commitment to development can be felt in many schools worldwide, which includes personality formation, the development of social and emotional skills, and the development of 21st-century competencies (Bebell & Stemler, 2013). In addition to acquiring knowledge, schools strive to develop the need for lifelong learning in their students, to become a skilled worker, a confident and persistent problem solver, an organized and conscientious leader, a person who formulates innovative ideas, and so on.

The OECD recognized the growing importance of soft skills, and a pilot assessment of students socio-emotional skills was conducted in 2013. Twenty-four thousand students took part in the evaluation. PISA tests are also gradually being supplemented with types of tasks that are suitable for measuring non-cognitive skills. In addition to math, comprehension, and science tests, tests to measure global competence have also emerged. Under global competence, there are skills such as interpreting intercultural phenomena, applying different perspectives, collaborating with people from other cultures.

One way to practice, develop, and evaluate soft skills is for an educational escape room. Escape rooms are "a live-action team-based game where players discover clues, solve puzzles, and accomplish tasks in one or more rooms to accomplish a specific goal (usually escaping from the room) in a limited amount of time" (Nicholson, 2015:1). Educational escape room games is an educational method explicitly designed to acquire expertise or develop key competencies through collaborative play activities (Fotaris & Mastoras, 2019). Escape rooms offer not only fun activities but also team-building exercises, active teaching of creative and group problem-solving, and exploring research issues related to problem-solving thinking, communication and collaboration skills (Pan et al., 2017). Using the escape rooms in an educational context has been shown to benefit students, such as facilitating the practice and development of teamwork, leadership, creative and problem-solving thinking, and communication skills (Taraldsen et al., 2020).

What are soft skills?

"Soft skills are character traits, attitudes, and behaviours – rather than technical aptitude or knowledge. Soft skills are the intangible, nontechnical, personality-specific skills that determine one's strengths as a leader, facilitator, mediator, and negotiator." (Robles, 2012:457). These differ from

"hard skills" (cognitive skills), such as comprehension and knowledge of mathematical tools that are relatively easier to teach, learn, and measure. The term "soft skills" encompasses attitudes, behaviours, and strategies that underpin school and work success, such as motivation, perseverance, and self-control. Appear in the literature as character skills (Marshall et al., 2017; Zamarro et al., 2016), non-cognitive skills (Scorza et al., 2016), social-emotional skills (Guerra et al., 2014; Humphrey et al., 2011), transversal skills (Magnoler, 2018), transferable skills (Nägele & Stalder, 2017), life skills (Pierce et al., 2016), 21st-century skills (Binkley et al., 2012), work skills (Cournoyer, 2016), critical competencies for a successful life and a well-functioning society (Rychen & Salganik, 2003) or skills for social progress (OECD, 2017).

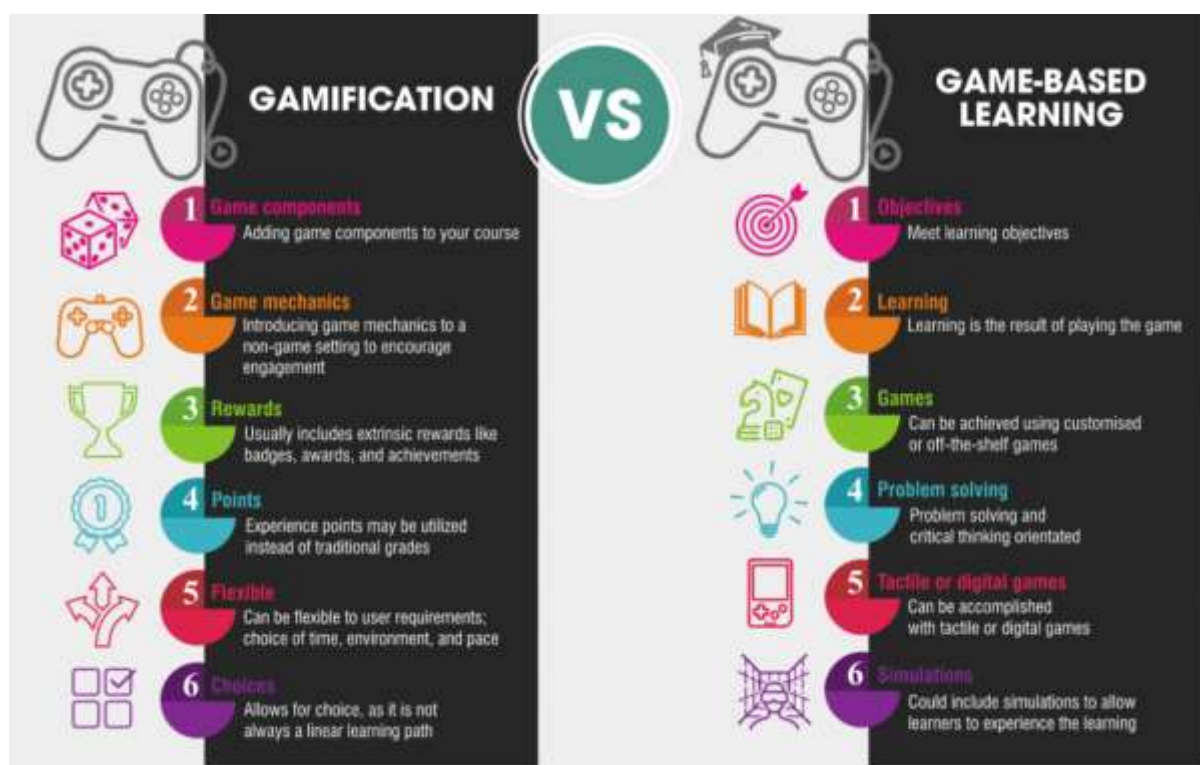
Soft skills are all abilities that define characteristics that transcend professional knowledge. These include communication skills, critical and structured thinking, problem-solving skills, creativity, teamwork, collaboration, negotiation skills, self-management, time and conflict management, cultural awareness, shared knowledge, responsibility, etiquette and good manners, courtesy, self-esteem, integrity, empathy, work ethic, project management, business management and with that, the list of soft skills is far from over (Hirsch, 2017; Majid et al., 2021; Moore, 2020). These skills we need to succeed in life but are not easily quantifiable (Beheshti, 2018; Majid et al., 2021). Regardless of the difficulty of defining the concept and scope of soft skills, the importance of teaching soft skills in higher education is felt. Today, communication skills, critical thinking, and interpersonal skills, including listening, problem-solving, and cultural awareness, are essential (Nealy, 2005). Soft skills could also be categorized into intrapersonal, interpersonal, and additional skills and knowledge.

In schools, the traditional curriculum focuses on teaching technical or "hard" skills, but despite this, the importance of soft skills is becoming more prominent (Beheshti, 2018). To ensure effective education, teachers need to address the teaching of soft skills. Purposeful education through soft skills programs brings significant results in the development of social and emotional skills (Boncu et al., 2017). To be effective, lessons should also include elements that students find fun and valuable (Lemberger et al., 2018).

Gamification, game-based learning and escape room

Gamification is one way to be suitable for teaching hard and soft skills in a fun and meaningful way through a combined approach (Sowell, 2020). The term "gamification" became popular in 2010. The process of gamifying classrooms means that teachers add game design elements to classroom experiences to increase student engagement in the curriculum through an immersive experience (Dichev & Dicheva, 2017; Martí Parreño et al., 2016). Research supports the claim that gamification in education increases student academic performance and retention of material when compared to traditional teaching models (Chen et al., 2018; Khan et al., 2017). Gamification offers a shift to active, learner-centred models that provide students with transferable attitudes and mindsets, including resilience, perseverance, adaptability, problem-solving, and teamwork (O'Brien & Pitera, 2019).

Unlike gamification, game-based learning relates to the use of games to enhance the learning experience. Game-based learning is not new to the educational environment. It offers opportunities related to active learning, creativity, problem-solving, self-regulation, fun and social interaction (Bober, 2010). "Games-based learning takes advantage of gaming technologies to create a fun, motivating, and interactive (virtual) learning environment that promotes situated experiential learning." (Tang et al., 2009:1) This constructivist approach to education includes elements of competition, commitment, and immediate reward. Students should receive immediate feedback, for example, on their results or, for example, when they have completed a goal. The game-based learning environment allows them to compete with each other or, more usefully, collaborate. This is a level of challenge that motivates learning and provides a framework story that encourages active student participation (Romero et al., 2015).

Figure 1.: *The differences between Gamification and Game-Based Learning*

Source: Moodley, 2018

One game that teachers are exploring incorporating in the classroom is the escape room. The escape room game is based on game-based learning and includes elements of gamification (Duggins, 2019; Grande-de-Prado et al., 2021; Guckian et al., 2020; López-Belmonte et al., 2020). The educational escape games combine the teaching of both hard and soft skills (Sowell, 2020).

Escape rooms - or escape games - are a relatively new entertainment genre that became popular worldwide in the early 2010s and can be found in many cities around the world (Heikkinen & Shumeyko, 2016). The escaping room is characterized by group play and is usually 4-8 people in group size. The duration of the game also varies, but most of the time, participants have one hour during which they have to solve various puzzles to get out of the room and complete the task successfully. The game takes place within a comprehensive narrative that is the basis for further design, such as how the room is designed, the look of the room, and the types of puzzles it contains (Nicholson, 2015).

Escape rooms have become increasingly popular leisure activities, and instructors have quickly recognized learning opportunities. An educational release room is defined as a creative learning environment - it can be built, for example, in a primary or secondary school, youth centre, college, etc., or in any place where learning is a part (Macías & Rocío, 2017).

Creating a good escape room for educational purposes is not an easy task as it involves creating the right combination of fun and playfulness and a planned learning goal. A balance of fun and learning is essential to designing an effective educational game. The advantage of the escaping room is that it is easy to build and test. Video game development is outside the purview of most teachers, but escape games can be made by anyone with some imagination (Clarke et al., 2017).

Educators report that through escape games, students developed soft skills, including teamwork, problem-solving, and communication skills (Humphrey, 2017). There are many pedagogical reasons why educational escape games are an attractive approach to learning. In addition to curriculum delivery, they are also suitable for developing many transversal or soft skills (Grande-de-Prado et al.,

2021; Guckian et al., 2020; Sowell, 2020; Taraldsen et al., 2020; Veldkamp & Knippels, 2021; Wiemker et al., 2015):

- **Developing Social Skills** - Escape rooms offer students the opportunity to work in groups to solve various problematic situations by solving puzzles. The goal is not to solve them alone, so the game requires communication and collaboration.
- **Problem Solving** - The escaping rooms contain several types of puzzles: from codes and cryptography, through traditional puzzles, to complex digital puzzles. Players face different problems that need to be solved. While working on puzzles, among other things, problem-solving skills develop.
- **Players develop resilience and creativity** as they repeatedly try to solve a puzzle in different ways and develop novel solutions each time.
- **Lateral Thinking** - Many of the problems and puzzles that players face in escaping rooms require them to think differently from their usual way of thinking and vary objects and ideas in novel ways. This type of thinking is important and supports creativity and innovation.
- **Time management** is also a test in the time-based challenge and can facilitate personal resource management.
- **Engagement** - The fact that you are participating in an exciting, time-dependent, immersive game can be appealing to many students, and the physical reality of the game provides a gaming experience that can be motivating for many.

In addition to these soft skills, the escape rooms also offer the opportunity for subject-specific learning. The mechanics of the escaping rooms are based on puzzles, tasks, quizzes, which can be used to integrate the content elements into the game. Furthermore, each step of the room can be designed to encourage or test specific knowledge or skills, thus creating an effective learning environment for the subjects' content (Grande-de-Prado et al., 2021).

Escape rooms are also interesting in that they offer a large number of opportunities for researchers and designers to explore a wide range of social and technical research issues (Pan et al., 2017).

Testing the self-developed escape room environment for educational purposes

The design of the educational escape room requires several steps. The process encompasses preparation, development, and finally, presentation. Between the development and demonstration phases, testing the game is a must. The game test at this stage allows you to discover if the balance between play and learning is right and allows you to refine the puzzles or add new ones if needed. As the developer observes people while playing his game, he may notice many design flaws.

The self-developed escape game was tested on September 4 2020, at the Subotica Music School in Subotica (Serbia). Two groups of graduating students from the school participated in the game. We had two rooms. The pre-room, where the introduction to the game took place, and all the rules were described, in addition to the monitoring during the game. The escape room was furnished in the school's IT room.

Figure 2.: *The appearance of the escaping room before starting the game test*



Source: Own photos

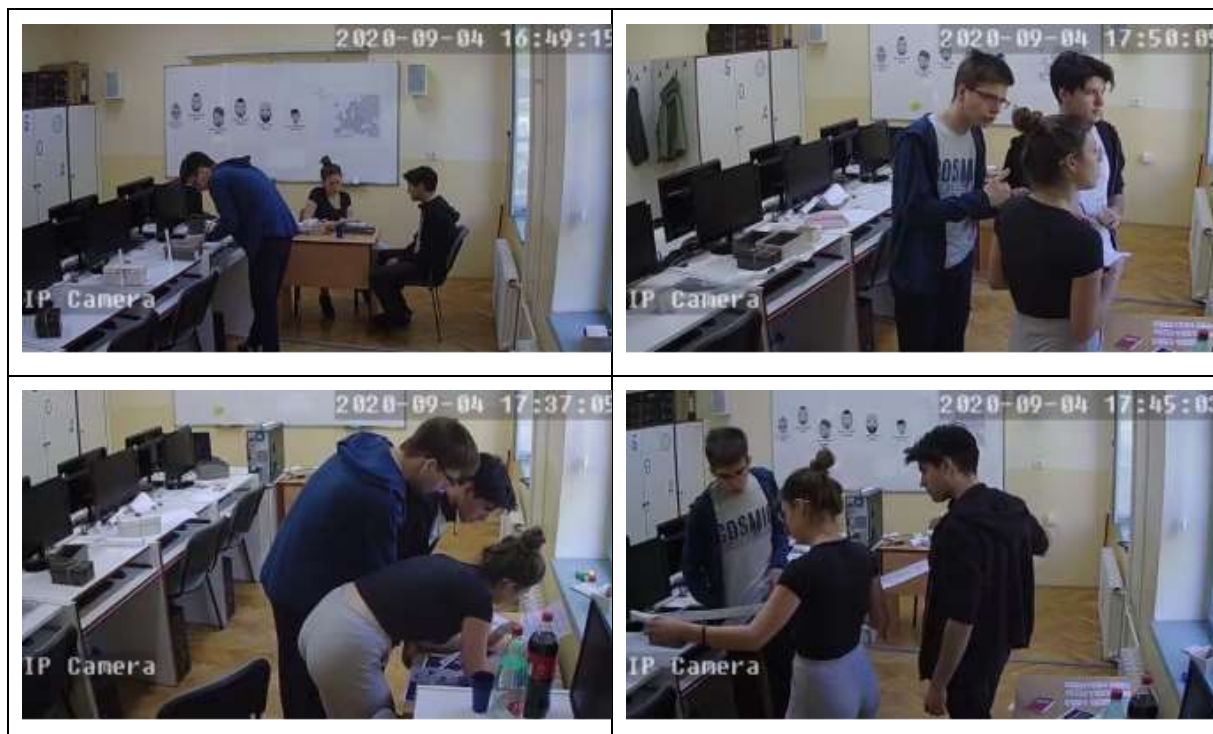
The first group consisted of three members (two boys and one girl). After starting the game test, it turned out that the camera speaker was not working as expected. Unfortunately, the students did not understand what the observer wanted to send them. There was crackling at the beginning of the game, and no sound went through after that. Because we anticipated all possible errors, the specific deficiency could be addressed. Before starting the game, a chat window point was set up on one of the computers for this case. Everything was fine with the microphone, so the observer heard everything that was said in the room, so the communication between the participants could be followed.

After entering the room, the group noticed the first task, the teacher's letter. The release of the scissors and the decoding of the coded part of the letter also went smoothly. The first box already caused a lot more headaches for the participants. Here, it turned out that one of the puzzles completely misled them, so as a result of the test, the Domino task will no longer be part of the game. Since the group didn't ask for help once, they got help with the Domino game, which was also a good sign of the crackling, as they knew their message had arrived in the chat window. After the crackle also disappeared, the game master had no means of signalling that their help message had arrived. This slowed down the game a bit. During the game, great emphasis should be placed on communication with the game master. For the game, it is important to test the communication as well as the tips and clues system. This system allows you to interact with players, which can greatly affect the flow of the game, so it must work smoothly.

In the first group, it was the communication that did not go smoothly. In fact, for a moment, the picture froze, so the gamemaster didn't see what was happening in the room for approx. for 5 minutes after opening the second box. The solution to the technical error was that you had to go into the escape room and restart the camera. Participants were informed in the introductory section that they were the first subjects in the game and that such mistakes could occur. They were also aware that the game master could also watch events from the room if the camera could not be quickly restored to its original mode during play. There were no additional technical issues until the end of the game, other than the camera not showing the correct time, but this was considered less important during the first test.

The first group ran through the boxes in a row. The participants didn't jump through a single puzzle. They fully followed the logic of building the game. The group successfully opened the last box after 72 minutes. True, 60 minutes are foreseen for the game, but since the goal here was to test the game, we didn't limit the time. It was important to play all the puzzles throughout so that you could ask back to every element of the room during the interview.

Figure 3.: *The first group while playing*



Source: Own photos

After the game, participants answered our questions about the room and the puzzles during the interview. The goal was to find out in which direction the game elements needed to be improved or further developed to provide an even better experience for future participants. As a result, the following was pointed out:

- There was not enough space. At the beginning of the game, when the puzzles were packed in boxes, the room seemed empty, but after unpacking, it filled quickly, and they felt it would have been better if the boxes had been farther apart.
- Deceptive puzzles. The Domino puzzle, which was also drawn out after the test, and the cards that could be found in all directions in the room. These are parts of the puzzle belonging to the third box, but visible places were placed from the beginning of the game. This confused them as they were constantly looking for the connection between the cards and the puzzles. A disturbing element in the Logistori game was a spreadsheet, which was part of the puzzle. They tried to fill it out, but they came up with different logic for the solution.

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- Previous experience. Participants have never participated in an escape room game. One participant thought there would be someone in the room with them, a built-in person who would know what to do.
 - Multiple coding tasks. The code and secret writing elements appear in two tasks. This was found to be especially fun, on the one hand, because they knew these types of tasks from the past.
 - Several items were built into the room. The jacket, which was part of the game but still did not look like it, resulted in complete immersion. Incorporating even more of these elements can help the player forget the natural world around him.
 - More movement. Because the boxes were close together, there was no need to move around the room. Almost everything happened in one place, so participants did not feel so much time pressure. If the elements of the game were thrown better apart and you had to change positions or run from one part of the room to another several time, it would make the game more dynamic.
 - Group size. They think another member would have made their job easier. However, the five people are already found by many.
 - Too easy / too heavy. "How many squares do you see in the picture?" game was known from the past, so this was solved very quickly. No puzzles were highlighted as too difficult, but the difficulty of the escaping room was rated 4 and 4.5 on a scale of 5, respectively. They think they could not have done it without help. The entertainment level was rated 4.7 and 5, respectively.
 - Their questions. Participants were curious about how long the development and construction process of the escaping room would take. In addition to this, the escaping room board games came into question, the so-called escape boxes, which are characterized by puzzles hidden in a box. These types of escape rooms exist for education too.

Students noticed that everyone showed outstanding knowledge in other tasks. Therefore, collaboration was an essential part of the game. They were all referring to each other. Without collaboration and communication, they would not have been able to play the game all the way through.

There was a two-hour break between the two groups while the room was set up again. The reorganization consisted of putting all the puzzles back in the appropriate box, arranging the boxes, placing the posters, pasting additional items next to the boxes, and replacing the scribbled puzzles. The Domino game in the second test was no longer included in the game. We were also wondering if that task could be solved without the game. In addition, space was expanded based on feedback from the first group. The first box was in the other half of the room, and the second and third boxes were further apart. We do not change anything about the placement of the cards.

The introductory part has been supplemented with information that the speaker is not working on the camera, and to do this, watch the chat window more often, where tips can come if they are very far from the right path. As for the technical issues, everything went smoothly for the afternoon group.

The second group started with five participants, but after 20 minutes, one of the players had to leave, leaving four until the end. They completed the game in less time; they needed 65 minutes, though there was a minor puzzle in the room. The two groups differed in that the second did not solve the tasks in a row but skipped one task at a time and later returned to the still unsolvable tasks. They also skipped the teacher's letter and decoded it at the beginning of the game instead of starting the game with the first box. However, the game flow was better as they followed the instructions on the monitor, so they did not waste time on useless things.

Figure 4.: The second group while playing



Source: Own photos

After the game, participants in the second group also answered our questions about the room and the puzzles during the interview. As a result, attention was drawn to the following:

- The appearance of the room. After the rearrangement, this group already judged the look and layout of the room to be just right. They also thought it seemed a little empty at first, but the room filled quickly as the puzzles came out of the boxes.
- Deceptive puzzles. Next to the first box, you can find an image with flags with the names of the countries. The image is used to help participants if they do not know the flags of the countries in the game. However, this help completely confused them. Some did not even understand what the picture was for at the end of the game. It was suggested to include fewer flags. They saw no logic in the gear game, just watched the letters and solved the puzzle based on it.
- Group size. They have been found suitable, and a maximum of five people are recommended for the game.
- Group roles. They believe there were no roles. Everyone had a chance to make a difference. For the variety of puzzles, each participant was able to excel in one of them. It is for this reason that they feel that a situation of conflict could not have arisen.

- Too easy / too heavy. Nothing was considered too easy or too heavy. The structure of the puzzle was perceived as entirely logical. It was highlighted that memory plays a significant role in the game as they needed to know where they stopped at the previous box. This was because they did not go along a path but left a puzzle unfinished. The difficulty of the escaping room was rated between 3 and 4 on a scale of 5. However, they, too, think they could not have done it all the way through without help. The fun level was rated 5.
- Entertainment. The fun and team-building nature of the game was recognized. What first arose in them is when they will have the opportunity to participate in such an experience again.
- Their questions. Participants wondered when they could play again. In the end, they even covered their own mistakes. It is believed that the excitement was a bit disturbed by the concentrations. In the beginning, for the sake of great haste, no basic things were noticed.

Students in the second group also noticed that everyone showed outstanding knowledge in other tasks and that communication was an essential part of the smooth play.

Figure 5.: *The look of the room after playing the game*



Source: Own photos

As a result of the game test, the puzzles have been further corrected: the Domino game will not be included in the puzzles in the future, the Logistori game and the flag help will be given a different look. In addition, great emphasis should be placed on the arrangement of the props in the halls. These two tests showed that it depends on the layout of how the participants start the game. Care must also be taken to have enough space while also paying attention to the game's dynamics.

We do not know what to do with technical errors. They can happen at any time. For example, if something happened to the camera or computer during the game, the game master would continue to follow the events from the room. Thus, instead of recording video, you would take notes based on the elements of the evaluation criteria system.

What's more worth emphasizing is that the students on the test have been classmates for at least three years. So they know each other well. However, students participating in the measurement may not be in such a close relationship. This fact can affect the frequency of collaboration, and within that, communication.

Conclusion

The puzzles and tasks of liberating play for educational purposes require learners to apply soft skills through solving complex problems. Applying critical thinking and problem-solving skills is a must. Time constraints encourage students to collaborate. The game is an immersive, action-based experience that is interesting and motivating for students, leading to a higher level of task activity (Chen et al., 2018; O'Brien & Pitera, 2019).

Soft skills such as collaboration, problem-solving, communication, adaptability, leadership, and time management are not part of the traditional curriculum. The development of soft skills needs to be integrated into the school education curriculum. Educators should be encouraged to play a role in developing soft skills. These skills are also very important in the development of an individual's personality. During recruitment interviews, employers are explicitly curious about what employees can offer in this area beyond technical or scientific knowledge.

Soft skills play an important role in shaping an individual's personality, enabling social competence, and complementing hard skills that meet the technical requirements of the job. As such, soft skills are of equal importance to hard skills, but should not be abused to disguise a person's lack of expertise in certain areas.

It is important to develop classroom activities that provide good practice in developing soft skills because they are key to learners and education reform. The focus is on increasing and measuring the development of students' soft skills; incorporating soft skills into the school curriculum; schools should encourage organizations and individuals to increase their interest and investment in many of the unknown points of soft skills reform. The educational escape room focuses specifically on these competencies.

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