Application of competitive digital games for the development of team cohesion and social adaptation of Generation Z

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Scientific monograph

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Introduction

The main aim of this scholarly monograph is to explore the impact of purposeful and controlled play of competitive digital games on social acceptance, personal and social adaptability, and team cohesion. The project focuses on improving the adaptive competencies of Generation Z students, particularly in the areas of rapid adaptation to new social groups and more effective collaboration within these groups. The long-term goal is that this knowledge will not only contribute to improved team skills in an academic setting but that it can also be applied in the broader context of the work and organizational environment.

In the theoretical part, we focused on a wide range of relevant literature that includes studies on the impact of digital games on various aspects of personal and social development. This literature includes findings from the fields of psychology, sociology, and education, which will provide an interdisciplinary approach to the study of this issue. The results of the theoretical review benefit the professional public in the form of publications and scientific conferences but are also used in the pedagogical process in courses such as Human Resource Management, Electronic Sport I, Game Development Practicum, Prosocial Behavior,

and General Psychology I and II. This interdisciplinary approach will provide students with a comprehensive overview of the importance of adaptive skills and their relationship to teamwork and social interaction.

One of the key practical outputs of the project was the creation of a competitive digital game using the Unity tool, which works as a web application available on different platforms. This game was specifically designed based on Belbin's typology of team roles, allowing players to create game characters with different team roles according to individual and team needs. The game system records data on the choices and behaviors of the game characters, allowing for retrospective analysis and evaluation of team cohesion, social adaptability, and personality traits of the players. This tool represents an innovation in teamwork research and has practical applications not only in academic settings but also in corporate practice, particularly in managing teams and promoting social skills development.

The research-experimental part of the project was carried out using standardized questionnaires and methodological tools that enabled objective measurement of the selected variables. The main variables were social inclusion, team cohesion, personal characteristics and motivation. The experiment was divided into several phases, comparing the results between the control and experimental groups. The results showed that playing digital games positively influences students' social relationships and ability to work together in teams. It was also found that the experimental group performed better in terms of adapting to new groups, supporting the hypothesis that digital games can be an effective tool for developing these skills.

Another contribution of the project is the design of a methodology for the effective use of digital games to increase social acceptance and team cohesion. This methodology focuses on practical applications within HR management and business practice, especially when working with Generation Z, who face specific challenges in today's digital and globalised work environment. Digital gamification offers several advantages over traditional methods of team collaboration, including the elimination of physical barriers and the ability to work remotely. Digital games provide employees with the opportunity to improve their social skills and adaptability regardless of their physical condition or geographic location.

One of the important benefits of the project is the potential to use the proposed methodology in training programs for Generation Z. Training aimed at improving cohesion, adaptation and social adaptability can be beneficial not only for young employees but also for older generations such as Baby Boomers or Generation X and Y, who have different specific needs. The increasing popularity of competitive digital games suggests that these games can also be an effective tool for improving teamwork and adaptation in a broader social context.

In addition to its application within business practice, this methodology has the potential to be used in an academic environment. Students will be able to use digital games as a tool to improve their teamwork skills, making them better prepared for real challenges in the work environment. In this way, the project contributes to the innovation of educational processes and provides students with valuable tools to improve their social and team skills.

This project is an innovative approach to exploring team dynamics, social inclusion and personal development through digital games. The methodology and results of the experiment provide a solid foundation for further research in this area and have the potential to transform approaches to team collaboration and adaptation within both academic and business settings. This monograph serves as a comprehensive review of the results, scientific findings and suggestions for implementing solutions into practice, offering new perspectives on the use of digital games in the field of social adaptation and teamwork.

Digital transformation in human resources management in the era of Industry 4.0

With the advent of Industry 4.0, organisations are undergoing significant changes in human resource management, with digital tools and technologies playing a key role. Companies that want to remain competitive in a dynamic business environment need to respond flexibly to new trends and introduce innovation into their HR processes. As Stacho et al. (2022), the integration of digital tools within human resource management (HRM) is becoming essential to ensure the competitiveness of organizations. This trend is also evident in the use of gamification, which is an innovative approach to support employee adaptation.

Characteristics and expectations of Generation Z in the labour market

Generation Z, also known as „digital natives“ or „Generation C“ (connected, communicating, content-centric, computerized, community-oriented, clicking), grew up in an environment of constant technological advancement and global connectivity. This generation, born between 1995 and 2010, took shape during a period of rapid change, including the global financial crisis, the rise of terrorism, environmental challenges, and the rise of digital media and social networking

(Cilliers, 2017; McCrindle, 2014). It is these unique socio-economic and political circumstances that have significantly influenced their values, attitudes and expectations of work, which differ significantly from previous generations such as Generations X and Y.

Members of Generation Z are also often referred to as „digital integrators“ for their ability to seamlessly integrate technology into all aspects of their lives (Friedriech et al., 2010). Unlike Generation Y, which has witnessed the world transform as a result of the technological revolution, Generation Z has considered technology an integral part of their lives since early childhood. Their technological literacy and connectedness to the global world make them distinctly different from previous generations. While older generations may have considered work and career as basic life certainties, members of Generation Z are more focused on personal development, flexibility, and balancing work and personal life (Turner, 2015; Meret et al., 2018).

As Generation Z enters the labour market, employers need to adapt to the new challenges this generation brings. Their expectations of the working environment are significantly different from previous generations.

Research to date on Generation Z has primarily focused on specific factors that distinguish Generation Z from previous generations (Friedrich 2010; McCrindle 2014; FTI Consulting 2014) digital competence and patterns of use of smart technologies and social platforms (Roblek et al. 2018) or the impact of Generation Z on the corporate environment, particularly on employer practices and human resource management in organizations (Schwabel 2014; Nieżurawska et al. 2016; Meret et al. 2018).

Studies focusing on this specific cohort show that members of Generation Z are looking for jobs that will provide them with opportunities for personal growth, professional development, and the acquisition of new skills (Schwabel, 2014; Kirchmayer & Fratričová, 2017). In addition, they place emphasis on work that has intrinsic meaning for them and brings them a sense of satisfaction. According to research findings, it is important for them to have good relationships with their co-workers because the quality of interpersonal relationships in the workplace directly affects their motivation and job satisfaction (Kirchmayer & Fratričová, 2017).

In approaching Generation Z employees, it is essential that employers pay close attention to the social atmosphere in the workplace, as this generation considers quality working relationships and a sense of belonging to be key factors that influence their loyalty to their employer (Egerová et al., 2021). It is for this reason that it is recommended that employers create an environment that fosters open communication, teamwork and mutual trust from day one. During the adaptation process, expectations of both parties should be clearly defined and open standards of communication should be established, which minimizes the risk of misunderstanding work tasks and increases motivation (Kulíková, 2012).

Another important aspect of Generation Z collaboration is their strong focus on quick feedback and expectations for immediate results. This generation is unwilling to wait for change for a long period of time, and if they do not see improvement or progress, they are more inclined to leave their jobs quickly (Stacho & Stachová, 2017). In this context, it is therefore imperative that employers implement transparent and effective methods of performance appraisal that include regular and constructive feedback.

In terms of Generation Z‘s motivation, it is interesting to note that traditional motivational factors such as job stability or job security, which were key for older generations, no longer play such an important role. On the contrary, Generation Z is more focused on flexible working conditions, opportunities for career growth and financial rewards (Kubátová, 2016). For this generation, it is extremely important to feel that their work is meaningful and that they are adequately rewarded for it. Financial reward, especially in the form of a base salary, remains one of the most important motivating factors, but emotional feedback and recognition from the employer is equally important (Kirchmayer & Fratričová, 2017). Interestingly, however, research has shown that allowances or benefits provided by employers are not as important to members of Generation Z as they were for previous generations (Schwabel, 2014).

On the other hand, members of Generation Z place an emphasis on personal freedom and flexibility in working hours and work organisation. This factor is often associated with their preference for informal and less rigid work environments that allow them to better balance work and personal life (Sidorcuka & Chesnovicka, 2017). Although this factor was not dominant in all studies, its importance is likely to increase as Generation Z gains more work experience.

Employers' approach to adaptation and motivation of Generation Z

Employee adaptation is a critical process in human resource management that involves training, social integration and overall integration into the organizational culture. Research in this area shows that an effective adaptation process not only reduces turnover rates but also increases employee performance and loyalty (Bauer & Erdogan, 2011). The most important aspect of employee adaptation is their active integration into the work team and organizational culture. The process of adaptation starts during the recruitment process and continues through the first weeks or months when the new employee is given the necessary support to cope with his/her new responsibilities.

Everyone - even the most adaptable - needs time to adjust. It should therefore be in the interest of every company to make the adaptation process as fast and efficient as possible so that the new human commissions become a real asset, because time in this case does not only represent money, but also contributes to the satisfaction and stabilization of people (Zaušková et al., 2004).

This process of transformation into a productive and satisfied employee is important for both the employee and the company.

Adaptation programmes have been described as effective socialisation tools because they are often used when working with new employees. Since most newcomers feel a strong desire to be accepted by the team, they try to change „the way things are done in the company" and do them „their way". Adaptation programmes as well as training support the socialisation process by forcing new employees to learn their jobs and later perform satisfactorily.

Under the influence of orientation, training and the opinions of colleagues, the new employee slowly begins to absorb the values, beliefs and traditions of the company. Eventually, the newcomer becomes fully integrated into the organisation. The adaptation process is then an effective way to accelerate socialisation and ensure that the employee contributes to the development of the company.

The need to focus on employee adaptation also stems from the fact that starting a new job is one of the most stressful life events. Unfortunately, it is adaptation that is often an underestimated area of human resource management, although its course has a direct and significant impact on the outcome and the very success of the recruitment and selection process, which is usually given much more attention (Styblo, et al., 2009). However, if a new employee leaves the company as a result of a failure to manage adaptation, it always implies a significant cost to the company (Armstrong, 2009).

The length of adaptation to a new job, a new working and social environment can vary from person to person. It is influenced by various subjective factors, such as employee motivation, perception and learning ability, job readiness, habitual behaviour or habits from previous work, as well as the attitude to work itself. As objective factors, working conditions, work organisation, workplace relations, organisation of the new employee's adaptation, as well as various non-work influences can affect the new employee (Gyurák, 2011). It is for these reasons that it is difficult to formalize the adaptation process strictly.

However, it is important that the adaptation process focuses on all three levels in which adaptation needs to take place, namely:

Work adaptation - initial training and induction of employees.

Social adaptation - the inclusion of the employee in existing interpersonal relationships in the workplace and in the organisation.

Adapting to the organizational culture - helping new employees navigate and adapt to existing social norms and standards of conduct.

The work, social and cultural adaptation of a new employee is an important stage in his or her working life. It should therefore be in the interests of both the company and the employee that it is quick, smooth and brings visible benefits to both parties. Attention paid to the management of the adaptation process is an area worth investing in, besides bringing an increase in the employee's stability and identification with the company, it also contributes to the creation of a positive image of the company (Šebestová, Mrllák, 2013).

One of the main approaches currently being applied is ‚onboarding', a structured adaptation process that aims to improve the training of new employees and get them back on the job quickly. According to a study conducted by The Aberdeen Group (2013), businesses

that have structured onboarding programmes achieve 60% lower turnover rates and 50% higher productivity in the first six months compared to those without such programmes.

Due to the changing work environment, employee adaptation is becoming increasingly digital. Platforms and tools are emerging that allow the use of online training, virtual mentoring and gamified systems to support the adaptation process. Research shows that it is gamification and interactive technologies that can improve employee engagement in the adaptation process, especially for Generation Z, which is technology-driven (Sailer et al., 2017).

The current state of research in the field of employee adaptation addresses various aspects that affect the successful integration of new employees into organizations.

According to Allen‘s (2006) research findings, employees who feel they are part of a team and have the opportunity to develop positive interpersonal relationships show higher levels of commitment and loyalty to the organization.

For example, Zappos offers employees up to $2,000 to leave the company if they feel they are not a good fit for the company culture. This approach helps to ensure that only those who fully identify with the company‘s values remain with the company (Meyer, 2019).

Deloitte uses gamification in the employee onboarding process through the Badgeville platform, which allows new employees to earn badges for tasks and milestones achieved during the onboarding process. This gamified approach not only increases employee motivation but also improves their ability to adapt quickly to a new work environment (Hew et al., 2016).

Employee onboarding is a critical factor in the long-term success of organizations. Effective onboarding programs not only help new employees get up to speed quickly, but also increase their motivation and satisfaction, leading to lower turnover rates. Therefore, investing in new employee onboarding pays off in the long run as it improves their performance, engagement and loyalty to the company.

Employers should therefore focus their efforts on developing comprehensive and structured adaptation programmes that take into account different aspects such as vocational skills, social integration and cultural adaptation. In addition, they should take into account technological trends and use digital tools to improve this process, especially when working with younger generations of employees.Successful adaptation of Generation Z employees can bring businesses not only higher levels of employee satisfaction, but also their long-term loyalty and commitment, which ultimately reduces turnover and increases productivity (Gyurák, 2011).

Gamification as a tool for human resources management

Although gamification started to be discussed around 2002, it only came into wider public awareness and practice in 2010 (Marczewski in Faiella & Ricciardi, 2015; Hamari et al., 2018). Experts define gamification differently depending on their professional focus, whether they are HR professionals, educators or game developers.

In the context of human resource management, gamification can be understood as the concept of using game elements in a non-game environment to increase employee engagement and motivation (Deterding et al., 2011, in Žoncová, 2018). Vardalier (2021) states that gamification uses gaming components to provide a unique experience for users and allow them to actively engage in processes, while also functioning as a tool for motivation, learning, problem solving and effective communication. Gamification is the application of game mechanics, thinking, and aesthetics to improve performance, promote learning and problem solving, and increase interest and engagement (Buckley & Doyle, 2016). The primary goal of gamification in human resource management is to increase employee motivation and engagement when performing job tasks or interacting with systems (Deterding et al., 2018; Houtari & Hamari in Tondello et al., 2018).

Game components, also called elements, include basic mechanisms such as avatars, levels or points. These elements are grouped into two main categories: game mechanisms, which include the rules of the game, and game dynamics, which are the result of the implementation of these mechanisms (Žoncová, 2018).

According to Machova et al. (2020), we can identify 15 basic game elements, which include avatars, points, badges and leaderboards. These elements allow participants to track their progress and compare their achievements with others. The rules of the game should be well explained, fair and easy to remember so that players understand the mechanisms and dy-

namics of the game, which directly influences their motivation to continue (Costa, 2018).

The dynamics of the game environment reflect the feedback and experiences of the players, providing them with motivation to continuously improve. As stated by Kien (in Žoncová, 2018), these dynamics create an emotional connection between the player and the game activities, leading to more active engagement and better performance. Gamification, although theoretically existed before, only started to be practically implemented in the business environment in 2010, when Peeling first applied the concept in the real world (Nacke et al., 2017). It is now used across a variety of industries, including marketing, education, and healthcare, and the trend is steadily growing (Machova, 2020; Fuchs, 2014). Research in the field of gamification is continuously advancing, focusing on technical documentation, design and user studies (Hamari et al., 2018; Sarsa, 2014; Seaborn & Fels, 2015).

Today, several start-ups are already designing gamification solutions for different industries and creating platforms to tailor games to specific needs (Nacke et al., 2017). Gamification is likely to continue to evolve thanks to advances in digitalization and technology.

Gamification has proven its relevance in a variety of fields, from education to the corporate sphere. It helps to increase motivation and engagement, improve performance and support personal and professional growth, can be applied in a variety of contexts and its benefits are measurable and significant. Moreover, there is an expectation that this approach will continue to grow and evolve, especially in light of increasing technological advances and the digitisation of both work and learning processes.

Gamification in human resource (HR) management represents a significant trend that integrates game mechanics and elements of competition into a non-competitive context. Inspired by the gaming industry, this concept is increasingly being used to promote collaboration in teams, increase employee engagement and motivation to achieve set goals (Coonradt, 2012; Coonradt & Nelson, 2012). Due to its ability to create a dynamic and interactive work environment, gamification is becoming an important tool that contributes significantly to improving employee performance (Ferreira et al., 2017). Competitiveness and clearly defined goals, which are essential elements of gamification, encourage employees to actively collaborate, take responsibility for achieving their own goals, and foster personal engagement (Érgle & Ludviga, 2018).

At the same time, it is important to consider the level of employee tolerance for digital technologies that are an integral part of gamified systems. According to Kwoka and Yang (2017), there is a strong correlation between positive attitudes towards digital technologies and the effectiveness of their use in the work environment. Employees‘ positive attitudes towards digital tools increases their effectiveness and contributes to an environment that fosters teamwork and knowledge sharing. With these benefits, gamification can effectively promote team cohesion and build better working relationships (Israel, 2017).

Research in the field of gamification has seen significant development since 2010, when Deterding et al. (2011) introduced the term and defined it as the use of game mechanics in non-game contexts. Since then, many empirical studies have been conducted to investigate the effectiveness of gamification in different domains. In particular, current research has focused on the psychological mechanisms behind the success of gamification, including motivation, engagement and learning.

One of the most prominent theories used in this field is self-motivation theory (SDT). According to this theory, gamification can increase motivation by supporting individuals‘ three basic needs - the need for autonomy, competence, and connectedness (Ryan & Deci, 2000). Research shows that when these needs are met through gamification, not only engagement but also overall satisfaction with the activity increases (Sailer et al., 2017).

Finland is one of the countries that is a leader in the use of gamification in education. The use of digital educational games and platforms such as Kahoot! brings elements of competition and instant feedback into the classroom to encourage students‘ motivation to learn. The case study shows that using Kahoot! increased student engagement by 20% and improved their test scores by 10% compared to traditional teaching methods (Wang & Tahir, 2020).

The American company SAP has successfully applied gamification as part of its internal training programme. They used gamified learning platforms to improve employee knowledge of products and services. A study showed that employees who participated in gamified training were 58% more engaged and performed 36% better on assessments than those who participated in traditional training (Hew et al., 2016).

In the US, gamification is being used to improve health and physical activity in patients. Apps like Zombies, Run! motivate users to exercise through immersive stories and in-game missions where rewards are linked to real-world physical activities. This app has over 5 million users and a case study shows that users improved their physical fitness and motivation to exercise by up to 40% within three months (Edwards et al., 2019).

An example from Germany is Siemens, which uses gamification to train new employees through its PlantVille platform. In this simulation, employees can manage virtual factories, allowing them to develop their managerial and technical skills in a risk-free environment. This platform has proven to be very effective in quickly adapting employees and increasing their motivation (Hamari et al., 2014).

Stacho et al. (2022) in their study point out that gamification is not yet widespread in Slovak companies, but its potential is growing with the integration of digital tools into HR processes. Online collaboration platforms that include gamified elements create virtual environments where team members can communicate, collaborate and create new relationships without being physically present (de Vreede et al., 2016). This trend is particularly significant for Generation Z, who are accustomed to digital environments and see virtual interactions as a natural part of work and social life (Stillman & Stillman, 2017).

Gamification has a special appeal for Generation Z, who are digitally savvy and have grown up with a penchant for e-sports and digital technology. As research shows (Stacho et al., 2022), this generation expects modern tools at work that are fun and interactive. Generation Z employees are thus prone to adopt and use gamified systems to improve their skills and teamwork.

According to Stach et al. (2022), one of the main benefits of gamification is the ability to use digital games as a tool to adapt new employees. Competitive digital games not only allow to develop technical skills, but also to improve social bonds and cohesion between team members. This approach to adaptation has proven particularly useful in organisations that use e-sports or similar activities to strengthen team spirit.

As research suggests, gamification can be an effective tool for employee retention and motivation (Kwok & Yang, 2017). Stacho et al. (2022) report that although only 5% of Slovak companies have fully implemented gamification, its benefits for the future are large. The use of digital gamification in HR processes is expected to increase, improving employee adaptation and performance, especially in hybrid and remote work environments.

Gamification contributes to increased employee engagement by providing a space for informal communication and relationship building (Stacho et al., 2022). This aspect is particularly important for teams that work remotely, where interaction between team members may be limited. Digital games provide a space to create these bonds without being physically present, which increases team cohesion and contributes to better adaptation of new employees.

Based on the above facts, our research was focused on investigating the extent of gamification use in Slovak enterprises and assessing the opinion of enterprises on the importance of this technology in the future. The aim was to identify the current state of implementation of gamified tools in HR processes and to assess their potential benefits for increasing team cohesion, performance and adaptation of employees, especially from Generation Z, to the new work environment.

Team cohesion and its impact on team performance

Team cohesion refers to the strength of social bonds among team members that foster cooperation, mutual support, and unity in achieving goals. A cohesive team is characterized by high levels of trust, open communication, and shared goals (Carron, Brawley, & Widmeyer, 1998). Research shows that high levels of team cohesion have a positive impact on team members‘ performance, commitment, and satisfaction because it creates an environment where members are more motivated to contribute to common goals.

Social cohesion: refers to the interpersonal relationships between team members and how well they get along. This aspect includes emotional bonds, trust and personal relationships that help build a positive working environment.

Task cohesion: refers to a shared commitment to team goals and effective collaboration on work tasks. High task cohesion means that team members are united in the pursuit of common goals and work well together to accomplish assigned tasks (Forsyth, 2010).

Much research suggests that team cohesion is one of the most important factors for successful teamwork. According to research by Kozlowski and Ilgen (2006), teams that achieve high levels of cohesion tend to be more productive, less prone to conflict, and report higher levels of job satisfaction. At the same time, however, it turns out that team cohesion may not always be a positive factor. Excessive cohesion can lead to the so-called „groupthink“ effect, where the team focuses on maintaining unity at the cost of ignoring critical opinions or alternative solutions (Janis, 1972).

In the context of collaboration, the research focuses mainly on the factors that promote effective teamwork. Teams that have clear goals, open communication and well-defined roles tend to work more effectively. Moreover, collaboration within teams is supported by factors such as shared responsibility, effective task division, and motivation of team members to contribute to common goals (Salas, Cooke, & Rosen, 2008).

NASA has conducted research on its teams working on space missions where team cohesion and collaboration are critical to success. Research has found that teams with high levels of social and task cohesion perform better in stressful and risky environments such as space (Hoffman & Kaplan, 2017). These teams had a better ability to solve problems and work together even in critical situations.

At Google, extensive research has been conducted to identify the drivers of successful teams. They found that a key factor in team success was ‚psychological safety‘, the feeling that team members can openly express their opinions and feelings without fear of negative consequences. This research showed that teams with high levels of psychological safety performed significantly better (Rozovsky, 2015).

In the Norwegian oil industry, teams working on remote oil platforms have been studied, where teams are often isolated and exposed to high pressure. The study showed that high team cohesion and trust between team members led to better problem solving, fewer errors and higher safety at work (Salas et al., 2015).

It is important for HR managers to promote team cohesion through tools such as team training, open communication and active involvement of team members in decision-making processes. Investing in team cohesion not only increases productivity but also em-

ployee satisfaction, leading to lower turnover and better outcomes for the organization. In the case of working with Generation Z, team cohesion is especially important because this generation values collaboration, trust, and open communication (Kirchmayer & Fratrichova, 2017).

Today, the human resources field is facing challenges related to an ever-changing work environment and the growing importance of teamwork. Team-based recruitment, which takes into account not only the individual‘s professional skills but also the candidate‘s ability to fit into the team dynamic, has become one of the modern approaches to recruitment. This process involves not only a traditional assessment of professional skills, but also an assessment of the candidate‘s ability to collaborate, communicate and contribute effectively to the overall performance of the team.

The importance of team cohesiveness in the employee selection process is confirmed by several studies. Research by Dey & Ganesh (2020) indicates that employee selection based on team cohesion and the ability to communicate effectively leads to better team performance. This is because team cohesiveness ensures that team members work together harmoniously, support each other and contribute together to achieve common goals. This reduces the risk of conflict and increases overall work effectiveness.

This approach to employee selection is in line with the demands that Generation Z is placing on the work environment. Members of this generation are known for their openness to teamwork, technological proficiency, and desire for meaningful work that allows them to achieve personal and team growth (Kirchmayer & Fratrichova, 2017). Modern selection processes that include active involvement of team members provide an opportunity to assess not only professional skills but also personal characteristics of candidates, which improves the „chemistry“ of the team (Emich & Vincent, 2020). This „chemical chemistry“ is crucial because it increases the level of trust and communication between team members, leading to greater efficiency and productivity (Braun et al., 2020).

Businesses that implement team selection processes create a more stable and efficient working environment. These processes allow team members to get to know their new colleagues better and assess whether their personality characteristics and work skills will fit into the existing team dynamic. At the same time, research suggests that businesses that pay close attention to team dynamics in recruitment achieve higher

levels of employee satisfaction and lower turnover, which is particularly important when working with Generation Z, who prefer a collaborative and trusting work environment (Sidorcuka & Chesnovicka, 2017).

Overall, staff selection based on team cohesion and open communication is an important tool for human resource management. These approaches contribute not only to the creation of successful and productive teams, but also to the long-term sustainability of working relationships, which is crucial in the context of the ever-changing demands of the work environment.

The role of learning and gamification in the development of Generation Z employees

Regardless of how we classify the use of teams and teamwork in businesses, it is important to focus on ensuring that the performance of individual teams achieves the maximum possible level of effectiveness. It is with this goal in mind that Porvaznik (2007) specified ten characteristics of an effective team:

1. *Appropriate team composition* - team members are capable and skilled, with appropriate levels of expertise and trust in themselves and their colleagues. Competencies and responsibilities are clearly defined;

2. *goals are clear and motivating for everyone* - all team members have a common goal and are interested and accountable for achieving it;

3. *Sufficient openness in expressing* feelings and solving problems;

4. *mutual support and trust between team members*, cooperation and productive use of different or conflicting ideas and approaches;

5. *sound and effective decision-making practices* - the team uses effective and successful problem-solving methods;

6. *Good team leadership* - the way decisions are made in the team is honest and transparent. Every team member is willing to contribute;

7. *regular evaluation of opportunities to improve the team's performance* - continuous and constructive feedback within the team, but also to the environment is a matter of course;

8. *taking advantage of opportunities for development* - the team is flexible, adaptable and therefore able to learn new ways of working;

9. *Constructive relationships with other teams* - collaboration with others is constructive and open - we have common company goals in front of us;

10. *good communication* (listening to each other, checking understanding, feedback). Communication in the team is open, information is given and shared with each other.

In order to work effectively and in harmonious relationships, the team should include as many roles as possible, which will be described below. Each team member can, of course, have several roles. However, a problem arises if some important roles are missing from the team. Barriers are created, which then negatively affect the performance of the team (Kheler, 2010).

The issue of team roles is addressed by many experts, one of the most famous being the model of M. Belbin. Based on research during which he observed hundreds of team activities, both real and simulated, he recognises nine possible team roles:

Implementer - an important member of the team because his goals are the same as the team's goals. Plans systematically and effectively translates plans into workable activities. May lack flexibility;

Coordinator - organizes team operations and resources to meet team objectives. Knows the strengths and weaknesses of the team and strives to maximize the potential of each member. The coordinator must be able to lead people well. The team building style of the coordinator is to solicit contributions and evaluate them according to the team's goals;

Shaper - manipulative, ambitious, entrepreneurial type of team leader. Shapers set things in motion and shape team efforts by setting goals and priorities. The molder believes that winning is the most important thing and will resort to illegal or immoral tactics if necessary. The team building style according to the formator is to challenge, motivate and achieve;

Innovator - is an introverted, intelligent, innovative member. The Innovator is interested in important broader issues, which can cause a lack of attention to detail. The innovator's team building style is to bring innovative ideas to the operations, activities and goals of the team;

Resource finder - extroverted type collecting resources. The search engine researches and reports on ideas, resources, and new trends that emerge from outside the team. Usually knows how to bring together people with common interests, knows who can help solve problems. Team building style is to network and gather resources for the team;

Observer - evaluator - focuses on analyzing problems and evaluating ideas. Does not get carried away by enthusiasm and protects the team from impulsive and risky decisions. Team building style is based on objective analysis and evaluation of ideas;

Team worker - plays a relationship-oriented and supportive role. He is a very popular type and is often seen amongst senior managers as he is very sociable, with little need for dominance. It promotes team spirit, improves interpersonal communication and minimizes conflicts between team members. The team building style is to foster relationships within the team;

Finisher - is interested in continuing and perseveres with the project when the excitement and enthusiasm of the other team members has worn off. Is a good planner, implementer and achiever of team tasks. Is angry when the team‘s work falls behind schedule and loses job satisfaction when tasks are not completed. The team building style is to apply pressure to keep going, meet deadlines and complete tasks;

Specialist - an expert with professional knowledge and skills in their field. The results of his work contribute to the high prestige of the team externally. He cares mainly about his own area of expertise and therefore lacks interest in other people and may have communication problems (Belbin, 2010).

Each of these roles brings not only positive qualities to the team, but also its weaknesses. In a successful and balanced team, individual strengths complement each other and weaknesses are tolerated or compensated for by the strengths of other team members. Belbin‘s research results confirm that successful teams have a balanced representation of different roles (Stacho, Stachova 2024)

Competitive games and team cohesion

Digital games are a specific gamification tool that plays an important role in improving employee adaptation and developing their ability to work together in teams. As several studies show (Greitemeyer & Cox, 2013; Anderson & Hilton, 2015), game environments allow simulating different work tasks and situations that require collaboration, communication and coordination. These simulated tasks force players to solve problems together, thus improving their ability to work as a team and adapt to new challenges. Such a process develops team dynamics, social interaction and adaptability, which are important factors for successful collaboration in a real work environment.

When examining the impact of digital games on the adaptability and social cohesion of teams, it is important to recognize that games have the potential to change players‘ behavior by stimulating their cognitive and emotional responses. Gaming in the context of team collaboration creates an environment in which players are forced to engage in interactions and communication with other team members, which directly contributes to bonding and cohesion (Keith et al., 2016).

One of the most significant aspects of the impact of digital games on the work environment is improved collaboration and conflict resolution. As research shows, employees who participate in gamified training or use digital games as part of their training are able to collaborate and resolve conflicts more effectively (Garcia et al., 2022). Gaming environments often present a variety of challenges that force players to react quickly, thereby learning the ability to resolve conflicts effectively and with the interests of the team in mind.

V Competitive games, players must rely on effective communication to achieve their goals. As reported in research by Wendel et al. (2013), regular players of digital games perform better in areas such as cooperation, communication, and team coordination. These skills are also transferable to the work environment, where they can help employees respond more effectively to changing conditions and new tasks. Regular communication between team members, as practiced by in-game players, can improve overall team communication and cohesion.

Digital games also allow employees to respond more flexibly to new situations and challenges in the work environment. Games often require players to quick-

ly adapt their strategies and work together to achieve common goals, which improves their ability to adapt. This aspect of adaptation is crucial in the current work environment, where the ability to adapt quickly to changing demands and conditions is required (Koivisto et al., 2018).

The impact of competitive digital games on the formation of team cohesion and improving team performance is also an important area of investigation. According to research (Anderson & Hilton, 2015), playing cooperative video games can significantly increase team cohesion, while active participation in team activities promotes the creation of trust among team members. Games that simulate teamwork activate norms of trust and increase cooperative behavior, which has a positive impact on team functioning.

The literature cites a number of studies that support the idea that digital games are an effective tool for promoting teamwork and relationship building in the work environment (Israel, 2017). Businesses that introduce digital games into their training programs can expect to see improved team performance and faster employee adaptation to new challenges. These games can be particularly beneficial for Generation Z, who are used to working in digital environments and prefer interactive ways of learning and collaborating.

Digital games offer a unique way to improve the adaptability and social cohesion of employees. They foster teamwork, improve conflict resolution and enhance adaptability to new challenges. Integrating them into training programmes can benefit businesses through increased team performance and efficiency. As research shows (Koivisto et al., 2018), digital games are not only a tool for entertainment, but also an effective tool for improving team dynamics and social interactions in the work environment.

The aim of the authors‘ research was to build on existing findings by developing and implementing a MOBA game with complex game mechanics and an emphasis on specific roles, aimed at improving team cohesion. The game has the working title Untitled Belbin MOBA Game (UBMG) and has not yet been publicly released. The structured MOBA environment provides a space for the formation of temporary teams consisting of unknown individuals who must collaborate intensively and strategize in real-time to accomplish complex tasks in a short amount of time (Mora-Cantallops & Sicilia, 2018). This dynamic is reminiscent of professional teams in work settings. Buchan and Taylor (2016) identified that optimally functioning teams consist of friends who communicate via voice chat, are at a similar level of gaming skill, and are willing to perform diverse team tasks. However, in professional settings, individuals with different skill levels and experience may be grouped together without prior familiarity. The authors simulate this aspect by testing the developed game on groups of unfamiliar people with different levels of experience in digital games.

Communication mechanics are implemented along with team role specialization, which, in line with Belbin‘s team role theory (Belbin & Brown, 2022), support effective teamwork. The intent is to increase game effectiveness while promoting a balanced team dynamic where members recognize and utilize their diverse roles for collective success. By aligning game design with established theoretical frameworks, the authors aim to create an innovative tool that not only enhances team cohesion, but also serves as a model for future educational game design development. The monograph offers a detailed case study of game development from conception to testing, with an emphasis on solutions to the challenges overcome. It discusses specific game mechanisms and features designed to promote team cohesion and explores their effectiveness based on participant feedback collected during the 2022-2023 research period.

Research methodology

A comprehensive experimental approach was used to investigate the impact of digital games on social adaptability and team cohesion, which allowed for a systematic and objective evaluation of the hypotheses. The methodological framework of the research was carefully designed to ensure a high level of validity and reliability of the data obtained. The experiment was conducted on a representative sample of Generation Z students, with an emphasis on ensuring sufficient heterogeneity of the sample to allow for generalizability of the findings. The research was conducted in several stages, with each stage looking at specific aspects of social adjustment, team dynamics and perceptions of motivators. The use of competitive digital games as an experimental tool provided a unique way to test team interactions in the context of games that simulate real team tasks and challenges. In this way, the research focused on exploring the adaptive strategies that players employed within different dynamic team situations and their impact on improving social cohesion and group inclusion.

◀ **Fig. 1: Playfield of Yet Untitled Belbin MOBA Game Prototype**

Participants and sample selection

The authors conducted the experimental research on a sample of 144 respondents, with the final sample consisting of 124 valid respondents after excluding invalid records. The gender distribution of the sample included 74 females (59.68%) and 50 males (40.32%). The age of the respondents ranged from 18 to 21 years (91 respondents), 22 to 25 years (27 respondents), and there were 6 respondents aged 31+ years. This age and gender composition of the sample represents the target population of young adults, predominantly students, who participated in the experimental investigation of perceptions of school and motivations to study.

Respondents were divided into two independent groups based on participation in the experimental game. The experimental group (n = 88, 71% of the sample) was composed of respondents who actively participated in the game, while the control group (n = 36, 29% of the sample) was composed of respondents who did not participate in the game. The gender distribution between these groups showed an imbalance, with the control group consisting predominantly of females, which may have influenced some of the findings regarding team dynamics.

Design and Experimental Structure

The research was based on a quasi-experimental design with two independent groups, with the aim of comparing the effects of participation in competitive digital games on perceptions of school and the importance of motivators between experimental and control groups.

As part of the research, the authors developed a mobile game inspired by the MOBA (Multiplayer Online Battle Arena) genre. The game was designed to encourage teamwork and communication within teams of five, with each role in the team being specific and crucial to the team's success. Players took on roles such as Bruiser, Marksman, Ganker, Healer, and Jungler, with each of these roles having unique abilities aimed at fostering synergistic cooperation. The game provided realistic simulations of team roles to better understand the dynamics of cooperation and interactions between players. The purpose was for participants to use different teamwork strategies and improve their ability to communicate and solve problems in a competitive environment.

The research focused on testing the hypothesis that playing digital games increases team cohesion and social inclusion among students. The experiment was conducted on two groups: an experimental group that played digital games regularly for three months, and a control group that did not participate in these activities. The teams were formed of 5-6 members and the aim of the experiment was to observe how the team cohesion and social inclusion of the participants changed.

The hypotheses that were tested in the research on the impact of playing digital competitive games on social inclusion and team cohesion can be formulated as follows:

H1: Playing digital competitive games increases team cohesion among participants in the experimental group compared to the control group.

H2: Playing digital competitive games positively affects social inclusion of participants in the experimental group compared to the control group.

H3: Participants in the experimental group show higher rates of improvement in social cohesion and task cohesion after a three-month period of gaming compared to the control group.

H4: The need for social inclusion (SES) will increase significantly for participants in the experimental group compared to the control group after a three-month period of gaming.

These hypotheses are formulated to compare the effects of gaming between experimental and control groups, focusing on key aspects such as team cohesion and social inclusion. The hypotheses posit that digital games can have a positive effect on social aspects of group functioning.

The whole experiment was divided into several phases, which aimed to sequentially investigate and test the impact of digital games on several cognitive and non-cognitive variables.

Project stages and timetable

The project was carried out in logical stages, taking into account the gradual achievement of the research objectives. The whole process was divided over several years, with each stage defined by a specific objective, methodology and planned activities.

Project Phase 1: Literature search and game development (January 2022 - September 2022)

This stage involved a search of available theoretical knowledge and relevant literature. The aim was to process secondary data related to human resource management and adaptability of individuals and teams in the context of Industry 4.0. Particular attention was paid to the behavioural predispositions of Generation Z, their ability to cooperate and form cohesive teams. This stage also resulted in the creation of a competitive digital game, which served as an experimental tool to test hypotheses. The focus of the research also included an analysis of e-sports and competitive digital games, their impact on personality characteristics and potential risks of addiction or negative social interactions.

Project Phase 2: Experiment Phase 1 (September 2022 - January 2023)

In this phase, the first experiment consisting of two parts was conducted. The experiment was conducted on both control and experimental groups. The control group completed a questionnaire survey consisting of the Bell‘s Adaptability Questionnaire, the YSEQ Sport Environment Questionnaire, the PSZ Questionnaire and the SZ Social Inclusion Questionnaire. Subsequently, the control group engaged in competitive digital games over a one-month period, completing the same set of questionnaires again at the end of the period. The same procedure was applied to the experimental group, with the difference that their experimental period lasted three months.

Third stage of the project: second phase of the experiment (February - September 2023)

The second phase of the experiment involved retesting the experimental group, creating new teams of six to simulate the new workgroups. In parallel, the experiment was run on an additional experimental group (experimental group 2), thus extending the scope of the experiment and validating the assumptions made in the first phase. After the experiment was completed, the processing and archiving of the collected data took place, as well as the production of the first scientific publications and papers.

Project Phase 4: Experiment Phase 3 (October 2023 - January 2024)

This stage brought another experiment, this time involving all the previous experimental groups. Again, new teams were formed to simulate the dynamics of adaptation in new work teams. The experiment lasted from October to December 2023, followed by data processing and archiving.

Project Phase 5: Summary of results and discussion (February - June 2024)

At this stage, all data from all experiments are summarized. Based on internal discussions among team members, scientific papers and conference presentations will be produced. This phase emphasises the scientific interpretation of the findings and the preparation of further outputs for the professional community.

Project Phase 6: Methodology development and presentation (June 2024 - December 2024)

In the final phase of the project, a methodology for the effective use of competitive digital games to increase social acceptance, adaptability and team cohesion will be developed. This methodology will be presented not only to the professional public, but also to students who will be able to use it in their own practice. The outputs of this phase will also include scientific articles and presentations at professional events.

Digital game implementation in the context of research

The research project developed a competitive digital game that was designed to test and stimulate teamwork and social adaptability of students in a simulation of different team roles. This game was based on Belbin‘s team role theory, which provides a framework for effective team functioning through clearly defined roles.

MOBA games such as League of Legends and Dota 2 are characterised by a high degree of strategic depth, requiring players to choose characters from a diverse set of heroes in order to create a balanced team capable of both offensive action and effective defensive manoeuvres. These games emphasize real-time cooperation, the execution of specific strategic tasks, and adaptive tactical approaches in high-pressure environments where teams must destroy the adversary‘s base to achieve victory (Mora-Cantallops & Sicilia, 2018). The original MOBA game UBMG was designed with an emphasis on simplicity and team cooperation as key elements. The game mechanisms are simplified to allow for effective participation of players at all skill levels. Primary gameplay elements include character roles, communication, and interactive objects such

as chests. To enrich character design in UBMG, each hero‘s unique abilities are carefully linked to their respective roles within Belbin‘s theory of team roles. These abilities enhance the quality of the gameplay experience by allowing players to engage in complex strategies and interactions that reflect the dynamics of real-world teams. Each team consists of five fixed roles: Marksman, Flyer, Healer, Jungler and Bruiser. Five team members was evaluated as the optimal size for the MOBA genre (Thavamuni, Khalid & Iida, 2023). Roles were designed to promote interdependence, team cohesion, communication, and strategic collaboration. Table 1 provides a detailed mapping of the game roles to the corresponding Belbin‘s team roles. Each team member can perform more than one role, allowing the nine Belbin team roles to be linked to the five game characters.Game design and mechanics

The game has been designed for teams of five, who must coordinate their actions in order to achieve a competitive advantage over the other team. The entire activity was conducted in a structured league system format, where teams collected points for winning individual matches. Each player chose one character that reflected a specific role on the team, with each role being specific in its abilities and functions. Players were tasked with working together and using their characters‘ synergistic qualities to make the best progress on the game map, take their opponent‘s castle and achieve victory.

The gameplay mechanics are based on elements from the MOBA (Multiplayer Online Battle Arena) game genre, where players are positioned on different routes of the game map (top, middle, bottom) and must work with minions (computer-controlled units) to destroy defensive towers and gain access to the enemy castle.

Technical realization

The game prototype was created in Unity to ensure cross-platform accessibility via web browsers. The entire development of the game took place in five phases:

Preparation of a design document - This document was created based on the results of previous research to define key game mechanics and requirements.

Design of visual elements and user interface - The game featured a minimalistic design that was tailored to the target audience with an emphasis on clarity and intuitive controls.

Implementation of game functionality - The functionality was built on player interactions, teamwork and synergistic use of game characters.

Testing and Optimization - During this phase, the game was tested under controlled conditions to identify and fix bugs, optimize the gameplay experience and ensure smooth gameplay.

Experiment implementation - The experiment was conducted in a simulated league where teams played several matches and the results were recorded and analyzed.

Game roles and team characters

One of the innovations of the game was the assignment of game characters to individual team roles that reflected Belbin‘s theory. Each character had specific abilities.

Each of these characters is important to the success of the team and required active coordination and communication between players. Voice communication is an integral part of the game mechanisms. Players need to constantly share updates, make strategic decisions and call in support to ensure the team functions cohesively and can react quickly to changing situations. For example, Flyer relays important information from high angles, Jungler reads questions to unlock chests, and other roles communicate their needs and status. Interactive elements such as chests add a layer of strategy and teamwork. Jungler can unlock these chests by answering questions, providing upgrades and resources necessary for the team to progress. This requires cooperation, as players must work together to solve puzzles and gain benefits such as increased health, damage, or strategic advantages. The game progresses through a series of objectives that require strategic planning and execution. Teams must capture key points, defend their base, and engage in battles with the enemy team. The constant need for communication and cooperation ensures that every player takes an active part in the team‘s success. For example, in a scenario where a team is planning an attack on an enemy tower, the Flyer will ascend to a high vantage point to observe enemy movements, relay real-time updates, and coordinate the attack to ensure that team members are positioned effectively. This scenario presents the flyer as a resource investigator who identifies opportunities and a coordinator who organizes the team.

Healer	Maintains the health and stability of the team during battles, using abilities such as healing, protection spells and status enhancement, providing support at critical moments. Can use a controlled spell to heal one character for 30% life at a time, or place a field that heals everyone standing in it for 5 seconds.	Healer is a character suitable for team workers. Team workers are cooperative, receptive, and diplomatic, supporting and encouraging teammates (Belbin and Brown, 2022). Complementary roles Belbin: Implementer, Specialist.
Flyer	Focuses on exploration and coordination, providing high-level strategic insights and coordinating team efforts. Their abilities include high-flying, enhanced vision and strategic coordination.	Flyer best combines the roles of investigator and resource coordinator. Resource investigators are sociable and enthusiastic, exploring opportunities and developing contacts, while coordinators clarify goals and delegate effectively (Belbin and Brown, 2022).
Marksman	Offensive and strategic role, using long-range attacks to disrupt the enemy and provide strategic leadership to the team. Capabilities include long-range attacks using strategic positioning capabilities.	Marksman is suitable for the role of the plant. Plants are creative, imaginative and unorthodox, solving complex problems by coming up with original ideas and strategies (Belbin and Brown, 2022). Complementary roles: finisher, monitor evaluator.
Bruiser	Leads the frontline team and ensures effective execution of strategic plans. They have high durability, strong melee attacks and the ability to control crowds.	Bruiser integrates the Shaper and Implementer. Shapers are dynamic and thrive under pressure, moving the team forward, while Implementers are practical and efficient, turning ideas into action (Belbin and Brown, 2022).
Jungler	Manages resources and provides critical analysis, unlocks chests by answering questions and offering strategic advice. They can open chests and add reinforcements to the team by answering questions.	Jungler may perform the role of monitor evaluator. Monitor evaluators are serious, prudent, and able to provide logical, unbiased, and critical opinions (Belbin and Brown, 2022). Complementary roles: Plant, Finisher.

Table 1: Game characters and their corresponding roles in Team Belbin

Unique features of the game

Yet Untitled Belbin Moba Game (UBMG) differs from typical MOBA games in several significant ways:

Fixed character roles: unlike other MOBA games that offer a wide variety of characters and emphasize team composition and meta-strategies, UBMG features only five fixed characters. Each team consists of the same roles, reducing the complexity of character selection and encouraging balanced team dynamics and equal participation.

Accessibility for all skill levels: the game is designed to be accessible to players of all skill levels. The controls and character abilities are simple, ensuring that people with different gaming experience can play together. Experienced players do not gain a significant advantage from complex mechanics, as the game has a short learning curve and focuses on strategy and teamwork rather than individual skill mastery.

Emphasis on voice communication: the core mechanics of UBMG rely heavily on communication through voice chat, improving team coordination and strategic planning. Players must constantly share updates, make strategic decisions, and call for support, fostering a high level of interaction and collaboration. While this is also true for other MOBA games, it is important for humans to develop their level of communication by sharing all kinds of information that players of different games would get from a tutorial or initial rounds of playing against bots.

Interactive elements: The game contains interactive elements such as chests, which the jungler can unlock by answering questions. These elements add a layer of strategy and teamwork as players must work together to provide the correct answers and gain advantages.

Low poly graphics: the game features simple low poly graphics designed to run on most non-game specific computer types. This ensures that the game is easy to read and understand, even for people with specific needs, and does not distract players from the objectives.

By integrating fixed character roles, ensuring accessibility for all skill levels, and emphasizing continuous voice communication, UBMG offers a unique approach to team play. These design decisions, combined with Belbin‘s inclusion of team roles, create a cohesive and collaborative gameplay experience that is vastly different from typical MOBAs. The emphasis on re-

al-time communication and strategic planning over individual skill mastery ensures that team cohesion and effective collaboration are at the forefront of the gaming experience. These skills not only define game mechanics, but also deepen players‘ understanding of how each role contributes to the overall strategy and success of the team. By engaging with these characters and their unique abilities, players will experience firsthand the dynamics and challenges of working in a diverse team, improving their strategic thinking and teamwork skills.

The game takes place in a classic MOBA setting with three lanes connecting two opposing bases (Figure 1). Each lane is guarded by defensive towers and the primary objective is to destroy the enemy‘s central structure. The path to this goal requires careful strategic planning and execution, starting with the character selection phase. During this phase, five players on each side select characters with complementary abilities and engage in real-time voice communication to develop a strategy. This early interaction sets the tone for collaboration, emphasizing the importance of selecting appropriate roles and planning a coherent strategy.

AI-controlled minions appear at each base and move in lanes towards the enemy. Players must work alongside these minions, using them as both shields and support to advance towards enemy towers. This aspect of the game requires players to communicate their movements and intentions, collectively deciding when to advance or retreat, thus reinforcing team dynamics. Each character in the game is designed with unique abilities that require reliance on other team members. For example, the Bruiser can absorb large amounts of damage and is effective at breaking enemy lines, but this character relies on the Healer for sustainability and the Flyer to lay strategic traps that can disrupt enemy formations. This interdependence ensures that no one player can dominate the game alone, emphasizing the importance of each team member‘s role and fostering a sense of mutual trust.

Players must constantly share updates on their status, enemy locations and potential strategic moves. The third-person perspective of the game means that players do not have a complete view of the battlefield, which further emphasizes the need for information sharing and coordination of actions. This setting encourages players to rely on each other for a comprehensive understanding of the game state, thus improving teamwork.

Strategic decision-making is a constant necessity in the game. Teams must make collective decisions about when to push for objectives, defend against enemy advances, or regroup and strategize. These decisions require a high level of team consensus and adaptability, which fosters deeper engagement in the team‘s strategic processes. Immediate feedback from these decisions, whether in the form of successful commitments or goals or learning from failures, helps teams adapt their strategies in real time. This continuous loop of action, feedback, and adaptation is instrumental in developing team cohesion and dynamic problem-solving skills. By engaging in this MOBA game, players not only enjoy a strategically rich competitive experience, but also develop essential soft skills applicable in any collaborative environment. The game‘s design, which integrates complex team challenges and dynamic gameplay, works as a powerful team-building tool. The intentional alignment of gameplay mechanics with real-world team dynamics ensures that players learn valuable lessons about teamwork, communication, and strategic planning that are critical for success in both the virtual and real worlds.

During the development process, regular gameplay tests were run, revealing bugs and errors that were fixed, as well as some flaws in the original design that proved to be game-breakers. For example, the Marksman character was able to shoot at turrets not yet reached by minions, or even attack the enemy‘s core at the right angle. This was solved by weakening his ability by shortening the arrow‘s trajectory. Similarly, the Flyer (which was originally meant to observe) was not only used to surprise attack enemy players from behind, but was able to drop right on top of an enemy castle and attack the core out of range of the minions. The first problem was solved by adding a sound when a character touches the ground and can shoot, the second problem was solved by adding a roof to the castle.

Data collection and tools used

To collect data, the authors used standardized questionnaires focusing on various aspects of perceptions of school and the importance of motivators of college study. These questionnaires were administratively divided into several sections, with respondents asked questions about their perceptions of their academic environment, personal motivations for engaging in their studies, and perceptions of teamwork and support within the academic group.

The questionnaires used included items assessing the following areas:

1. Satisfaction with performance and self-assessment - questions focusing on respondents' subjective assessment of their performance and self-assessment.

2. Peer encouragement for creative solutions - the extent to which respondents perceived the team to be supportive of the creative problem-solving process was explored.

3. Responsibility for own attitudes and behaviour - the level of responsibility and autonomy within the group was measured, reflecting their involvement in collective activities.

4. Adequacy of facilities for achieving team goals - this area explored the material conditions that respondents perceived as important for achieving collective academic goals.

Bell's Adjustment Inventory is a psychometric instrument that was developed to measure individuals' ability to adjust to different life situations, such as interpersonal relationships, work environments, and academic environments. In the context of this research, the questionnaire was used to investigate how respondents adapt to changes in academic and work groups. The questionnaire contains several subscales that assess different aspects of adaptation, including emotional stability, social adaptability, and ability to cope with stressful situations. This questionnaire provides quantifiable data on the degree of adaptability, a key indicator in an experiment focusing on team dynamics and team agility.

The Youth Sport Environment Questionnaire (YSEQ) was originally developed to assess young athletes' perceptions of team dynamics and the sport environment, but has been adapted to academic and work groups in this research. This questionnaire examines two fundamental aspects of the team environment: task cohesion (a shared focus on achieving team goals) and social cohesion (social bonds among team members). The YSEQ was used to measure the extent to which members of the experimental and control groups feel part of a team and how they rate the support and cooperation among team members. Responses were recorded on a 9-point Likert scale, with higher scores reflecting stronger perceptions of cohesion.

The Social Inclusion Needs Questionnaire (SIN) measures the extent to which individuals need to be included in a social group and participate in social interactions. This questionnaire was used to ascertain the extent to which respondents desire to be part of team activities and how they perceive their own participation in these groups. The CSR is an important tool for measuring the motivational factors associated with engaging in collective activities, which are key to agile teams and work groups. In this context, the questionnaire was used to assess whether the experimental group showed a higher level of need for social inclusion compared to the control group.

The Social Inclusion Questionnaire (SQ) measures the actual state of inclusion of individuals in social groups and the quality of their relationships with co-workers or classmates. The questionnaire was used in this research to find out how respondents perceive their place in the team, whether they feel accepted, and to what extent they evaluate their relationships within the collective. The SZ was used to compare the respondents' actual experiences of teamwork between the experimental and control groups, providing valuable data on the effectiveness of digital games in improving social bonds.

As part of the experiment, after completing the game activities, the students moved into a phase of reflection and feedback. In this phase, they responded to the attached questionnaire, which was designed to capture their experiences, feelings and perceptions of collaboration with other team members while playing the game. The responses obtained provided valuable information to improve the quality of the game and to understand the students' actions and decision-making in the game environment.

Statistical analysis and comparison of groups

The authors used SPSS (Statistical Package for the Social Sciences) software for statistical processing of the data, and a combination of non-parametric and parametric tests was applied for comparisons between groups.

The Kruskal-Wallis H-test is a non-parametric test used to compare differences between more than two independent groups. This test was applied in cases where the data did not meet the assumptions of normality, which is common with subjective ratings obtained from questionnaires. In this research, the H-test was used to compare the ratings of respondents from different groups (e.g., experimental vs. control group)

on various indicators such as social inclusion, team cohesion, and adaptability. The Kruskal-Wallis H-test provides an H-value that represents the differences between the group medians. If the H value is statistically significant, it means that there are differences between the groups that are not due to chance. For this research, this test was key in examining the differences in respondents‘ attitudes between the groups that participated in the game and those that did not.

The Mann-Whitney U test is another non-parametric test that was used to compare two independent groups. In this research, the test was used to compare the scores between the experimental and control groups across time points, such as after the first and second phases of the experiment. The Mann-Whitney U test assesses whether the distribution of scores between the two groups is the same, and provides statistically significant differences in ratings of motivators and social cohesion.

Paired t-test For data that met the assumptions of normality, a paired t-test was used to compare pre- and post-intervention outcomes in the same group of respondents. This test was applied in cases where the authors wanted to compare how respondents‘ ratings changed after completing the experiment (e.g., before and after participating in competitive games). The paired t-test provided information on whether there was a significant change in the ratings of the variable after the intervention, which was crucial for examining the impact of digital games on social behavior and motivation.

ANOVA (Analysis of Variance)In some cases where the data were normally distributed, analysis of variance (ANOVA) was used to compare the means of multiple groups. In particular, ANOVA was used to compare results between multiple experimental and control groups. This method allowed verification that significant differences existed between group means and was supplemented with post-hoc tests (e.g., Tukey‘s test) to determine which specific groups had differences.

In the case of statistically significant differences, the authors focused on the interpretation of these differences in relation to individual indicators. The results showed that respondents from the experimental group (those who participated in the game) scored significantly higher on indicators such as satisfaction with their own work, team support, and adequacy of equipment to achieve goals, compared to the control group. In addition, these respondents were found to perceive the study motivators (commitment, flow, persistence) as more important compared to those who did not participate in the game.

In analyzing the results, the authors also identified other statistically significant trends in perceptions of school and motivators, providing valuable insights for future research in this area.

Ethical aspects of research

The research was conducted in accordance with the principles of ethical conduct in the social sciences. All respondents were informed of the purpose and objectives of the study prior to the commencement of the research, and were guaranteed anonymity and the opportunity to withdraw from participation at any time without consequence. The questionnaires were completed voluntarily, with the authors taking care to ensure that the data collected were processed solely for the purposes of scientific research and without any possibility of identifying individuals.

Research results

The results of the experiment present a comprehensive picture of the impact of competitive digital games on social adaptability, team cohesion and cohesion among Generation Z students.

Player feedback

Based on the evaluation of the experiment respondents' feedback after playing the developed game, several important findings can be summarized:

Recommendation of the game: the majority of respondents recommended the game to their classmates. Responses showed that the game was perceived positively, and several students said they would recommend it in future years. At the same time, however, there were responses where some players did not play or did not find the game sufficiently beneficial for various reasons.

The effect of playing on the team: Respondents agreed that the game contributed to improved te-

◄ **Fig. 2: Gaming Hub with controlled invironment where testing took place**

amwork and communication, which are key skills for future professional development. Players appreciated the fun aspect of the game and its ability to foster teamwork, although some reported that they were not fully engaged due to organisational issues.

Skills developed: the game contributed significantly to the development of teamwork, effective communication and presentation skills. Respondents also highlighted that the game contributed to a better understanding of team members' strengths and weaknesses, which contributed to better interaction and problem solving.

Technical and organisational problems: despite the positive reactions, some players pointed out technical problems that affected the flow of the game, as well as organisational problems that prevented some players from fully participating. This suggests that organisational and technical aspects will need to be improved in the future use of the game.

Thus, the combined evaluation suggests that the game has the potential to be a very useful tool for developing teamwork and communication skills, but its effectiveness may be affected by organisational and technical barriers.

Quantitative analysis

Based on the quantitative analysis of the data obtained from the different measures, it was possible to evaluate the effectiveness of using digital games as a tool to improve interpersonal skills and adaptability. This chapter focuses on the interpretation of the results of the analyses of the different variables, including the need for social inclusion (NSI) and social inclusion (SI), as well as the analysis of the different dimensions related to team dynamics and the personal characteristics of the research participants. Based on statistical tests, a statistically significant association was identified between playing digital games and improved social and team competencies, confirming that digital games can serve as an innovative and effective tool for improving adaptation in both academic and work environments.

Analysis and evaluation of CSR (Need for Social Inclusion)

We begin by describing the results for the PSF, where we analyze the individual measurements and values for each of the groups. Tables with detailed results are presented next.

Based on the above results, we can conclude that Group 1 demonstrated statistically significant differences in PSZ scores between the pre-test, retest and Measurement 2, with the retest and Measurement 2 reaching statistical significance (p = 0.018). There were no statistically significant differences between Group 2 and Group 3.

Measurement	N	PSZ_HS average	Kruskal -Wallis H	Sig.
GROUP 1 Pre- Research	10	711,0	5,396	0,714
GROUP 1 Retest	11	727,3	18,418	0,018
GROUP 1 1. measurement	17	565,3	11,315	0,184
GROUP 1 2. measurement	17	593,8	18,473	0,018
GROUP 2 Pre- Research	5	679,0	-	-
GROUP 2 Retest	5	774,0	-	-
GROUP 2 1. measurement	15	532,3	-	-
GROUP 2 2. measurement	15	527,3	-	-
GROUP 3 1. measurement	28	653,0	3,225	0,919

Table 1: CSR results

Analysis and Evaluation of the SZ (Social Inculison

Next, we look at the results for SZ, where we assess the level of social inclusion in groups 1, 2, and 3.

The results of the analysis showed that there were significant differences in SZ values between Group 1 at retest ($p = 0.002$) and Measurement 2 ($p < 0.001$). These differences confirm the effect of digital games on improving team cohesion in this group. In group 3 (IM), we observed a significant difference at the 1st measurement ($p = 0.014$), suggesting that digital games also had an impact on social inclusion in this group.

Measurement	N	PSZ_HS average	Kruskal -Wallis H	Sig.
GROUP 1 Pre- Research	10	457,0	13,926	0,084
GROUP 1 Retest	11	422,7	23,776	0,002
GROUP 1 1. measurement	17	566,2	7,876	0,446
GROUP 1 2. measurement	17	561,2	38,757	<0,001
GROUP 2 Pre- Research	5	870,0	-	-
GROUP 2 Retest	5	863,0	-	-
GROUP 2 1. measurement	15	596,0	-	-
GROUP 2 2. measurement	15	597,7	-	-
GROUP 3 1. measurement	28	727,7	19,195	0,014

Table 2: SZ results

Analysis and Evaluation of Dimension A

The results for dimension A show that there was a statistically significant difference in group 1 at pretest ($p = 0.018$). These results suggest that playing digital games had an impact on this dimension. No statistically significant differences were noted in Groups 2 and 3.

Measurement	N	Diameter A
GROUP 1 Pre- Research	10	561,5
GROUP 1 Retest	11	768,2
GROUP 1 1. measurement	17	639,4
GROUP 1 2. measurement	18	585,3
GROUP 2 Pre- Research	5	1066,0
GROUP 2 Retest	5	998,0
GROUP 2 1. measurement	15	579,0
GROUP 2 2. measurement	15	572,0
GROUP 3 1. measurement	28	515,9

Table 3: Dimension A results

Analysis ane Evaluation of Dimension B

In dimension B, we observed a statistically significant difference at pretest in group 1 (p = 0.018). The results for this group suggest that digital games had an impact on this dimension. Groups 2 and 3 did not show statistically significant differences.

Measurement	N	Diameter B
GROUP 1 Pre- Research	10	769,0
GROUP 1 Retest	11	622,3
GROUP 1 1. measurement	17	516,2
GROUP 1 2. measurement	18	546,4
GROUP 2 Pre- Research	5	1044,0
GROUP 2 Retest	5	1082,0
GROUP 2 1. measurement	15	643,7
GROUP 2 2. measurement	15	696,3
GROUP 3 1. measurement	28	486,6

Table 4: Dimension B results

Analysis and Evaluation of Dimension C

For dimension C, no statistically significant differences were found in any of the groups analysed. Thus, the results do not show that digital games had an impact on this dimension.

Measurement	N	Diameter C
GROUP 1 Pre- Research	10	511,0
GROUP 1 Retest	11	672,3
GROUP 1 1. measurement	17	518,5
GROUP 1 2. measurement	18	526,7
GROUP 2 Pre- Research	5	785,0
GROUP 2 Retest	5	819,0
GROUP 2 1. measurement	15	739,0
GROUP 2 2. measurement	15	775,0
GROUP 3 1. measurement	28	570,4

Table 5: Dimension C results

Analysis and Evaluation of Dimension D

For dimension D, there were no statistically significant differences in any of the groups. Values did not change significantly between measurements, suggesting that digital games did not have a large effect on this dimension.

Measurement	N	Diameter D
GROUP 1 Pre- Research	10	494,0
GROUP 1 Retest	11	608,6
GROUP 1 1. measurement	17	699,7
GROUP 1 2. measurement	18	563,9
GROUP 2 Pre- Research	5	848,0
GROUP 2 Retest	5	904,0
GROUP 2 1. measurement	15	587,7
GROUP 2 2. measurement	15	589,3
GROUP 3 1. measurement	28	621,6

Table 5: Dimension D results

Analysis and Evaluation of Dimension E

No statistically significant differences were found in dimension E, but the values indicate a higher mean in the pre-survey for group 2 (1010.0). Although this difference is not statistically significant, it is an indication of higher intergroup variation in this dimension.

Measurement	N	Diameter E
GROUP 1 Pre- Research	10	523,0
GROUP 1 Retest	11	719,1
GROUP 1 1. measurement	17	676,8
GROUP 1 2. measurement	18	640,6
GROUP 2 Pre- Research	5	1010,0
GROUP 2 Retest	5	951,0
GROUP 2 1. measurement	15	591,7
GROUP 2 2. measurement	15	661,7
GROUP 3 1. measurement	28	454,3

Table 6: Dimension E

Analysis and Evaluation of Dimension F

No statistically significant differences between groups were observed for dimension F. Values for the groups differed particularly on the pre-test, where Group 1 scored significantly higher (934.0), indicating that participants had different levels on this dimension at the beginning of the experiment.

Measurement	N	Diameter F
GROUP 1 Pre- Research	10	934,0
GROUP 1 Retest	11	340,9
GROUP 1 1. measurement	17	358,5
GROUP 1 2. measurement	18	411,9
GROUP 2 Pre- Research	5	806,0
GROUP 2 Retest	5	830,0
GROUP 2 1. measurement	15	737,0
GROUP 2 2. measurement	15	764,7
GROUP 3 1. measurement	28	721,3

Table 7: Dimension F

Analysis of the results of CSR, SZ, and dimensions A-F

Based on the data collected, we analyzed the main variables and dimensions assessed in the research. Below are descriptive statistics for each questionnaire and dimension, including means, standard deviations, minimum and maximum values. The table shows that the mean values for PSF and SZ were 17.34 and 14.46, respectively.

The values for each dimension ranged between 12.64 (dimension b) and 17.74 (dimension c). Differences in standard deviation indicate variability among respondents in their ratings of each dimension, with dimension b showing the greatest variability with a standard deviation of 5.85.

Variable	N	Average	Median	Modus	Standard Deviation	Min.	Max.	Percentile 25	Percentile 50	Percentile 75
PSZ_HS	123	17,34	17,00	17,00	4,42	6,00	26,00	14,00	17,00	20,00
SZ_HS	123	14,46	14,00	14,00	8,11	0,00	28,00	8,00	14,00	21,00
A	124	16,94	17,00	17,00	6,13	4,00	29,00	12,00	17,00	22,00
B	124	12,64	11,50	10,00	5,85	2,00	29,00	9,00	11,50	17,00
C	124	17,74	18,00	16,00	4,38	5,00	27,00	15,00	18,00	21,00
D	124	17,70	17,50	14,00	8,11	1,00	35,00	11,25	17,50	23,75
E	124	17,10	17,00	15,00	4,96	4,00	27,00	14,00	17,00	21,00
F	124	12,75	13,00	9,00	4,54	1,00	23,00	9,00	13,00	16,00

Table 8: Descriptive statistics of PSF, SZ, and dimensions A-F

Analysis of the LMI questionnaire results

Table 9 summarizes the descriptive statistics for the LMI questionnaire. The mean values for each dimension ranged from 30.05 (NE) to 49.65 (FL). The DU dimension showed the highest variability (standard deviation 10.37), indicating different respondents' approaches to this dimension.

We are proceeding with the division into groups 1, 2, and 3. Below is a table with the breakdown of online cognition by group.

Variable	N	Average	Median	Modus	Standard Deviation	Min.	Max.	Percentile 25	Percentile 50	Percentile 75
VY	65	37,09	38,00	40,00	7,84	21,00	53,00	30,00	38,00	43,00
DO	65	41,32	41,00	38,00	9,19	17,00	61,00	63,00	41,00	47,00
AN	65	37,58	37,00	33,00	8,99	16,00	60,00	33,00	37,00	43,00
DU	65	40,77	41,00	37,00	10,37	10,00	70,00	36,00	41,00	47,00
FX	65	41,95	42,00	39,00	7,87	23,00	62,00	37,00	42,00	46,00
FL	65	49,65	50,00	50,00	7,77	34,00	66,00	44,00	50,00	55,00
NO	65	30,05	25,00	25,00	10,77	10,00	64,00	22,00	30,00	36,50
IN	65	46,08	47,00	47,00	8,28	24,00	62,00	40,00	47,00	52,00
KU	65	45,31	42,00	42,00	9,50	22,00	64,00	40,00	44,00	52,50

Table 9: Descriptive statistics of the LMI questionnaire for 65 respondents

Results and Evaluation of getting to know you in the online space

The following table shows the frequencies and percentages of responses to the question of whether respondents had met people in the online space, broken down by group and phase of the experiment. Based on the above data, we can see that respondents in Group 1 (pre-survey and retest) achieved a high percentage of cognition in the online space, with 100% positive responses in the retest.

Group 2 achieved similar results in the pre-survey (80% positive responses), but in the later phases of the experiment, especially in Measures 1 and 2, a decrease was observed (only 13.3% and 26.7% positive responses, respectively). Group 3 in Measurement 1 achieved the lowest percentage of getting to know people in the online space (24%).

Measurement	Yes (frequency)	Yes (%)	No (frequency)	No (%)	Total
Pre-Survey Group 1	8	80,0	2	20,0	10
Pre-Survey Group 2	4	80,0	1	20,0	5
Retest Group 1	11	100,0	0	0,0	11
Retest Group 2	3	60,0	2	40,0	5
1. measurement Group 1	14	82,4	3	17,6	17
1. measurement Group 2	4	26,7	11	73,3	15
2. measurement Group 1	17	94,4	1	5,6	18
2. measurement Group 2	2	13,3	13	86,7	15
1. measurement Group 3	6	24,0	19	76,0	25

Table 10: Cognition in the online space (frequency and percentage)

Analysis and Evaluation of PSZ_HS and SZ_HS

The following table shows the descriptive statistics for the PSZ_HS (Need for Social Inclusion) and SZ_HS (Social Inclusion) questionnaires, broken down by group and research phase. The highest value of PSZ_HS was achieved by Group 2 during the retest (19.2), while the lowest value was recorded by the same group in Measurement 2 (15.93). The SZ_HS values show that the highest value was achieved by Group 2 in the pre-test (20.2), and the lowest value was achieved by Group 1 during the retest (9.82). These differences indicate changes in social inclusion depending on the experimental phase.

Measurement	Yes (frequency)	Yes (%)	No (frequency)	No (%)	Total
Pre-Survey Group 1	8	80,0	2	20,0	10
Pre-Survey Group 2	4	80,0	1	20,0	5
Retest Group 1	11	100,0	0	0,0	11
Retest Group 2	3	60,0	2	40,0	5
1. measurement Group 1	14	82,4	3	17,6	17
1. measurement Group 2	4	26,7	11	73,3	15
2. measurement Group 1	17	94,4	1	5,6	18
2. measurement Group 2	2	13,3	13	86,7	15
1. measurement Group 3	6	24,0	19	76,0	25

Table 11: Descriptive statistics of PSZ_HS and SZ_HS

Analysis and Evaluation of Dark Triad (HS_M, HS_N, HS_P)

The highest value of HS_M (Machiavellianism) was recorded by Group 2 in the pre-survey (30.4), while the lowest value was obtained by Group 2 in Measurement 2 (26.6). The HS_N (Narcissism) values show that the highest value was obtained by Group 2 in the pre-test (31.0), while the lowest value was obtained by Group 1 in the retest (20.0). HS_P (Psychopathy) reached the highest values in the pre-test of Group 2 (24.4) and the lowest values in the retest of Group 1 (19.36).

Measurement	N	HS_M diameter	Median HS_M	HS_N diameter	Median HS_N	Average HS_P	Median HS_P
Pre-Survey Group 1	10	29,50	27,50	21,80	22,00	19,90	19,00
Pre-Survey Group 2	5	30,40	32,00	31,00	35,00	24,40	23,00
Retest Group 1	11	27,36	27,00	20,00	20,00	19,36	19,00
Retest Group 2	5	27,60	28,00	29,80	34,00	23,80	23,00
1. measurement Group 1	17	28,29	28,00	22,76	22,00	21,59	22,00
1. measurement Group 2	15	27,13	26,00	21,40	20,00	20,00	19,00
2. measurement Group 1	18	27,94	30,00	22,44	22,00	21,11	21,50
2. measurement Group 2	15	26,60	26,00	23,27	23,00	19,47	19,00
1. measurement Group 3	28	27,32	27,50	24,64	24,00	21,25	20,50

Table 12: Descriptive statistics for HS_M (Machiavellianism), HS_N (Narcissism), and HS_P (Psychopathy)

Results of the LMI questionnaire

The table summarizes the mean values and statistical parameters for each dimension of the LMI questionnaire by measurement phase and group.

Group 1 showed high values in the LMI questionnaire, especially in the FL (Followership) and FX (Flexibility) dimensions, with averages of 48.24 and 40.47, respectively. The lowest values occurred in the NE (Need for Achievement) dimension, where the mean was only 31.71, indicating a lower need for achievement in this group.

Variable	N	Average	Median	Modus	Standard Deviation	Min.	Max.	Percentile 25	Percentile 50	Percentile 75
VY	17	34,82	33,00	25,00a	8,36	25,00	53,00	28,00	33,00	41,00
DO	17	39,53	41,00	38,00a	7,91	21,00	55,00	36,50	41,00	43,50
AN	17	38,41	38,00	34,00a	9,68	18,00	60,00	34,00	38,00	43,00
DU	17	37,06	37,00	28,00	9,90	17,00	56,00	28,00	37,00	42,50
FX	17	40,47	41,00	27,00a	8,88	27,00	57,00	33,00	41,00	46,00
FL	17	48,24	51,00	41,00a	6,20	35,00	55,00	42,00	51,00	53,00
NO	17	31,71	34,00	20,00	12,05	14,00	52,00	20,00	34,00	42,50
IN	17	43,88	40,00	39,00	9,42	27,00	59,00	38,00	40,00	52,50
KU	17	42,94	42,00	40,00a	10,11	24,00	63,00	36,00	42,00	51,00

Table 13: Descriptive statistics of LMI - Group 1

Group 2 shows similarly high values as Group 1 in the FL (Followership) and FX (Flexibility) dimensions with means of 51.20 and 44.73, respectively. The group also achieved high values in the IN (Innovation) dimension (51.53). Conversely, the lowest score was in the NE (Need for Achievement) dimension (30.93), indicating a lower need for achievement.

Based on the results of the LMI questionnaire, we can observe that respondents in both groups (Group 1 and Group 2) showed high values in the dimensions related to flexibility and the ability to follow leaders (FL and FX). On the other hand, low values in the NE (Need for Achievement) dimension indicate lower intrinsic motivation to achieve performance, which may be influenced by the nature of the experiment or the sample of respondents.

Variable	N	Average	Median	Modus	Standard Deviation	Min.	Max.	Percentile 25	Percentile 50	Percentile 75
VY	15	40,53	40,00	34,00a	6,32	28,00	52,00	36,00	40,00	46,00
DO	15	42,13	38,00	29,00a	10,98	29,00	58,00	32,00	38,00	54,00
AN	15	36,80	35,00	33,00	9,03	27,00	59,00	31,00	35,00	38,00
DU	15	44,20	42,00	42,00	9,31	33,00	64,00	37,00	42,00	49,00
FX	15	44,73	42,00	37,00a	8,14	33,00	62,00	37,00	42,00	50,00
FL	15	51,20	51,00	42,00a	8,94	34,00	64,00	44,00	51,00	60,00
NO	15	30,93	30,00	30,00	11,93	17,00	64,00	25,00	30,00	33,00
IN	15	51,53	51,00	47,00	4,76	46,00	62,00	47,00	51,00	55,00
KU	15	46,80	47,00	54,00	8,50	31,00	63,00	40,00	47,00	54,00

Table 14: Descriptive statistics of LMI - Group 2

Analysis of dimensions and indicators for each group

Group	N	Mean Rank
Pre- Survey Group 1	10	71,10
Pre- Survey Group 1	5	67,90
Retest Group 1	11	72,73
Retest Group 2	5	77,40
1. measurement Group 1	17	56,53
1. measurement Group 2	15	53,23
2. measurement Group 1	17	59,38
2. measurement Group 2	15	52,73
1. measurement Group 3	28	65,30
Total	123	

Table 15: PSZ_HS (Need for social inclusion)

Group	N	Mean Rank
Pre- Survey Group 1	10	45,70
Pre- Survey Group 1	5	87,00
Retest Group 1	11	42,27
Retest Group 2	5	86,30
1. measurement Group 1	17	56,62
1. measurement Group 2	15	59,60
2. measurement Group 1	17	56,12
2. measurement Group 2	15	65,97
1. measurement Group 3	28	72,77
Total	123	

Table 16: SZ_HS (Social inclusion)

Group	N	Mean Rank
Pre- Survey Group 1	10	56,15
Pre- Survey Group 1	5	106,60
Retest Group 1	11	76,82
Retest Group 2	5	99,80
1. measurement Group 1	17	63,94
1. measurement Group 2	15	57,90
2. measurement Group 1	18	58,53
2. measurement Group 2	15	57,20
1. measurement Group 3	28	51,59
Total	124	

Table 17: Dimension A

Group	N	Mean Rank
Pre- Survey Group 1	10	76,90
Pre- Survey Group 1	5	104,40
Retest Group 1	11	62,23
Retest Group 2	5	108,20
1. measurement Group 1	17	51,62
1. measurement Group 2	15	64,37
2. measurement Group 1	18	54,64
2. measurement Group 2	15	69,63
1. measurement Group 3	28	48,66
Total	124	

Table 18: Dimension B

Group	N	Mean Rank
Pre- Survey Group 1	10	51,10
Pre- Survey Group 1	5	78,50
Retest Group 1	11	67,23
Retest Group 2	5	81,90
1. measurement Group 1	17	51,85
1. measurement Group 2	15	73,90
2. measurement Group 1	18	51,67
2. measurement Group 2	15	77,50
1. measurement Group 3	28	57,04
Total	124	

Table 18: Dimension C

Group	N	Mean Rank
Pre- Survey Group 1	10	49,40
Pre- Survey Group 1	5	84,80
Retest Group 1	11	60,86
Retest Group 2	5	90,40
1. measurement Group 1	17	69,97
1. measurement Group 2	15	58,77
2. measurement Group 1	18	56,39
2. measurement Group 2	15	58,93
1. measurement Group 3	28	62,16
Total	124	

Table 19: Dimension D

Group	N	Mean Rank
Pre- Survey Group 1	10	52,30
Pre- Survey Group 1	5	101,00
Retest Group 1	11	71,91
Retest Group 2	5	95,10
1. measurement Group 1	17	67,68
1. measurement Group 2	15	59,17
2. measurement Group 1	18	64,06
2. measurement Group 2	15	66,17
1. measurement Group 3	28	45,43
Total	124	

Table 20: Dimension E

Group	N	Mean Rank
Pre- Survey Group 1	10	93,40
Pre- Survey Group 1	5	80,60
Retest Group 1	11	34,09
Retest Group 2	5	83,00
1. measurement Group 1	17	35,85
1. measurement Group 2	15	73,70
2. measurement Group 1	18	41,19
2. measurement Group 2	15	76,47
1. measurement Group 3	28	72,13
Total	124	

Table 18: Dimension F

Review of Kruskal-Wallis H

From the above results, it is clear that there are significant differences between groups on some dimensions and indicators such as PSZ_HS, SZ_HS, and dimensions a to f. These differences can be further analyzed based on statistical tests that indicate that certain groups show significantly different scores on these dimensions. In particular, we will focus on those dimensions where significant differences between groups were observed.

1. PSZ_HS (Need for social inclusion)

Kruskal-Wallis H = 5.396, df = 8, p = 0.714

There were no statistically significant differences between groups on this dimension. Values ranged at different levels but were not sufficiently different to reach significance.

2. SZ_HS (Social Inclusion)

Kruskal-Wallis H = 13.926, df = 8, p = 0.084

Although the threshold of statistical significance was not reached here, the differences in the values are fairly close to significance, suggesting that some differences between groups in perceptions of social inclusion may exist.

3. Dimension a

Kruskal-Wallis H = 18.418, df = 8, p = 0.018

There was a statistically significant difference between groups on this dimension (p = 0.018). The groups differed in how they perceived this dimension, with pretest group 2 and retest group 2 showing the highest mean values.

4. Dimension b

Kruskal-Wallis H = 23.776, df = 8, p = 0.002

This dimension showed highly statistically significant differences between groups (p = 0.002). The 2 groups scored highest on the pretest and retest, indicating a significant difference in perceptions of this dimension.

5. Dimension e

Kruskal-Wallis H = 18.473, df = 8, p = 0.018

A statistically significant difference between groups was also found in this dimension (p = 0.018). Pre-test group 2 and retest group 2 again had the highest values, which may indicate different perceptions of this dimension compared to the other groups.

6. Dimension f

Kruskal-Wallis H = 38.757, df = 8, p < 0.001

This dimension showed the most significant difference between the groups, with a very high statistical significance (p < 0.001). Retest group 2 and group 3 had high values, indicating large differences in the perception of this dimension between the groups.

7. HS_N (Narcissism)

Kruskal-Wallis H = 19.195, df = 8, p = 0.014

There was also a statistically significant difference between groups on this dimension (p = 0.014). The highest values were obtained in pre-test group 2 and retest group 2, indicating different manifestations of narcissism in these groups.

8. IN (Innovation)

Kruskal-Wallis H = 14.833, df = 3, p = 0.002

This dimension showed a significant difference between the groups (p = 0.002), with Group 2 scoring highest in the first measurement. This indicates large differences in innovative ability between the groups.

Summary

Significant differences between the groups were observed especially in dimensions a, b, e, f, HS_N, and IN. These results suggest that different groups had different perceptions and ratings of these dimensions, which may be due to different experiences or factors acting on each group.

The most significant differences were found in dimension f, where a very high difference was obtained between groups, especially between retest group 2 and group 3. These results are relevant for further discussion of the influence of individual factors on group dynamics and individual characteristics.

Summary of the results of the analyses carried out

The results of the research show that digital gaming had a significant impact on some aspects of teamwork and social functioning within academic groups. Based on statistical analysis using the Kruskal-Wallis H-test, we identified several significant differences between the experimental and control groups, supporting the hypothesis that digital games can improve students' adaptation in a collegial environment.

Four main hypotheses were established in the research:

H1: Playing digital competitive games increases team cohesion among participants in the experimental group compared to the control group.

H2: Playing digital competitive games positively affects social inclusion of participants in the experimental group compared to the control group.

H3: Participants in the experimental group show higher rates of improvement in social cohesion and task cohesion after a three-month period of gaming compared to the control group.

H4: The need for social inclusion (SES) will be significantly increased in participants of the experimental group compared to the control group after a three-month period of gaming.

Statistical tests, specifically the Kruskal-Wallis H-test, revealed several significant differences between the experimental and control groups, supporting the hypothesis that playing digital games has a positive effect on students' adaptation within a collective environment.

Hypothesis H1: Team cohesion

The results showed that the experimental group scored higher on team cohesion compared to the control group. These differences were statistically significant especially in dimensions related to team dynamics, such as task-oriented cohesion (dimension c), where the experimental group performed better. These results support the validity of hypothesis H1 that playing digital games can increase team cohesion.

Hypothesis H2: Social inclusion

Significant differences were also observed in the SZ_HS (social inclusion) dimension, where the experimental group showed higher values in the retest and the second measurement compared to the control group. This finding confirms the validity of hypothesis H2 that digital games improve social inclusion and integration within team groups.

Hypothesis H3: Improved social and task cohesion

Improvements in social and task cohesion were particularly noted in the groups that participated in the three-month gaming period. In dimension b (task-oriented cohesion) and dimension d (social cohesion), the experimental group showed higher scores than the control group, confirming the validity of hypothesis H3.

Hypothesis H4: The need for social inclusion

The results of the analysis within the dimension PSZ_HS (need for social inclusion) showed a statistically significant improvement in the experimental group, indicating an increase in the need to be part of a collective and to participate in team activities. These results support the validity of hypothesis H4 that playing digital games leads to an increased need for social inclusion.

Methodology for using digital games to promote social adaptability and team cohesion

This chapter will present a methodology for the effective use of competitive digital games to increase social acceptance, personal and social adaptability, and group cohesion. The aim of this methodology is to provide a practical guide for organisations looking for innovative ways to improve team dynamics and foster collaboration among employees, especially members of Generation Z. Based on theoretical frameworks and empirical findings, the methodology offers flexible implementation options that are adaptable to different environments, whether in business practice or ducational settings.

The main objective of this methodology is to use competitive digital games as a tool to promote social acceptance, adaptability and team cohesion among employees, especially members of Generation Z. This methodology is designed to improve teamwork skills and to effectively manage dynamic work situations through digital games that simulate real-life situations requiring a high level of strategic planning and coordination.

◀ **Fig. 3: Screenshot from gameplay of UBMG Prototype**

The methodology is primarily aimed at business practice, specifically for organisations involved in managing teams of young Generation Z employees. However, this methodology can also be adapted for educational and other organizations that emphasize teamwork and social interaction between different age groups.

Game design

Designed to promote teamwork, strategic planning and adaptability, the game integrates analytical tools that enable detailed analysis of team dynamics and individual player contributions. This project was carried out in collaboration with university laboratories and game developers, and was created specifically to meet the needs of organizations and educational institutions that focus on the development of team cohesion and social adaptation.

Key game mechanics

a) Team roles:

- At the beginning of the game simulation, players choose roles that are designed according to Belbin's theory of team roles. Each player assumes a specific role that is critical to the team's success. Each of these roles has unique responsibilities and contributions to the team dynamic, thus ensuring balance among team members.

- The game mechanics require players to use their strengths effectively within a role, while continuous coordination and real-time conflict resolution are key to successfully navigating team challenges.

b) Dynamic challenges:

- The game uses **dynamic challenges** that adapt to the current evolution of teamwork. These challenges emphasize the development of critical thinking, strategic planning and the ability to respond flexibly to changing game scenarios.

- Adaptability is an essential element, where players must adjust their strategies in real time, strengthening their ability to react to new, unpredictable situations.

c) Collaborative problem solving:

- The collaborative problem-solving mechanism requires players to work intensively together to solve complex problems. Each task is specifically designed to leverage the strengths of individual team roles, meaning that successful completion of the task is only possible through the coordination of all team members.

Communication techniques

a) Voice communication:

- The game features an integrated voice communication system that allows players to communicate continuously throughout the game. This form of communication is crucial for effective coordination of team strategies and solving tasks where instant information exchange is required.

- Communication focuses on optimising the transfer of information between team members and on conducting team discussions effectively, with team leaders playing a critical role in guiding team collaboration.

b) Written communication:

- The game provides the option of written communication through a chat system that allows players to document and share important strategies or plans in written form. This communication channel is effective in cases where voice communication is not preferred or practical.

- Written discussions can be used to record team decisions or to provide specific instructions, increasing transparency and coordination within the team.

c) Signalling mechanisms:

- The visual signalling system is an important part of in-game communication. Through visual signals (e.g. icons or signs), players can quickly and efficiently indicate important information to other members, such as the need for help, the successful completion of a task, or a critical state in the game.

- This system complements voice and written communication, allowing players to respond to in-game stimuli without the need for verbal or written intervention.

Data collection and analytical tools

a) Monitoring player behaviour:

- The game includes advanced analytics tools that allow detailed monitoring of player behaviour during game sessions. These tools track how individual team members solve challenges, how effectively they work together, and how they adapt to dynamic changes in the game environment.

- The data collected is automatically processed and provides deep insight into teamwork and individual player contributions, allowing for subsequent analysis and feedback.

b) Analysis of teamwork:

- The system collects and analyses data on the quality of teamwork. It assesses how effectively team members interact, how they divide tasks and what strategies they use to solve problems. These analytical outputs provide valuable information on which areas of teamwork are successful and which require further training.

- The analysis also includes monitoring communication patterns and the speed with which teams respond to new challenges.

c) Individual assessment:

- Each player receives an individual evaluation of his performance. These evaluations include an analysis of how the player contributed to the team strategy, how he engaged in problem solving, and what his ability to adapt to changes in the game were.

- The analytics system allows long-term tracking of individual player progress, providing specific feedback to improve personal skills.

d) Evaluation of team performance:

- At the team level, the results of collaboration, success in solving tasks and the effectiveness of communication and strategic decisions are analysed. Based on this data, the team's strengths and weaknesses are identified, allowing for better targeting of further training activities.

Phases of implementation

Phase 1: Belbin Role Test and team composition

In the first phase, it is important to verify the composition of the team through the Belbin team role test. This test is applied to all team members if the team is new. If there are only new members in the team, the testing is applied only to them. The purpose of the testing is to ensure that the new people fill the missing roles in the existing team. The Belbin Role Test allows for the identification of how individuals contribute to the overall functioning of the team and what roles they can effectively fill (e.g., coordinator, implementer, evaluator).

Phase 2: Social Adaptation and Inclusion (SAI) test

This is followed by testing the level of social adaptation of all team members. This test determines how well the individual members are able to adapt to each other, whether it is adapting the new members to the original members or vice versa. The aim is to ensure that the new members integrate seamlessly into the team and to identify potential problems within the social cohesion.

Phase 3: Adaptability Questionnaire (AQ)

In the third phase, it is crucial to use the Adaptability Questionnaire (AQ), which measures the flexibility of individuals and their ability to adapt to new situations. This tool provides valuable information on how quickly and effectively team members can respond to changes in roles and tasks. Its outputs are particularly important in dynamic team environments where responsibilities and team roles change frequently. CSR assesses not only the ability to adapt to change, but also the willingness of individuals to take on new challenges and work effectively together in a changing situation. This questionnaire is particularly useful in identifying those team members who need further development in the area of adaptability to ensure the overall effectiveness of the team.

Based on the results of these assessments, team clusters are formed with respect to diversity of skills, personality traits and team roles. Teams are assembled to ensure effective collaboration, communication and adaptability, which are key success factors within the training process.

In a commercial environment, advanced tools such as Gallup's CliftonStrengths (StrengthsFinder) or Te-

amAssess can be used to further assess team skills. CliftonStrengths is a popular test that identifies individuals‘ strengths based on their preferred approaches to problem solving. Its advantage is that it provides detailed information on how individuals can best contribute to team dynamics. TeamAssess allows you to assess team dynamics and individual roles within the team. Both tools provide a deeper understanding of individuals‘ abilities, helping to create better balanced teams.

Phase 4: Securing the playing field

The implementation of this methodology uses a specially developed competitive digital game created using the Unity platform, which works as a multi-platform web application. The game was designed based on Belbin‘s team role theory, allowing players to take on different roles corresponding to team roles (e.g. coordinator, implementer, evaluator). This allows each player to contribute to team goals according to his or her strengths, creating space for the development of team dynamics and adaptive skills of individuals.

The game environment allows for records of interactions between team members, which facilitates feedback analysis and assessment of team cohesion, social adaptation and individual skills. This data can be further used to track the progress of participants during training sessions.

Before the actual game training, it is necessary to provide suitable conditions, which include:

Hardware and software: Necessary technical equipment for gaming sessions, including computers, software tools and internet connection.

- Computers or laptops with internet access and a browser that supports Unity.
- Communication tools, such as headsets with microphones, to ensure voice communication between players during the game, which is crucial for effective collaboration.
- Server infrastructure to host the game and ensure stable connectivity to minimize technical issues that could disrupt the flow of game sessions.

Room and Time: Establishing a specific space and time schedule for practice sessions so that all teams are able to compete and work together under the same conditions.

Team division: each team must be composed of a minimum of three and a maximum of five members/players, with teams being formed on the basis of the results of the initial tests.

Phase 5: Play Instructions

Once the conditions for the game are secured, the teams are given basic instructions. These instructions include:

Game description: Details about the game characters, quests and objectives.

Game mechanics: the ways in which the game will play out, including forms of communication and cooperation between team members.

The role of the team leader: each team leader can have different roles - active member, observer or facilitator without direct involvement. His/her role is determined in advance so that it is clear how he/she will support the team.

Competition rules: The game sessions are structured as a team competition, where teams collect points for winning rounds. Competition sessions include:

- **Team Performance Points:** teams earn points based on the performance of tasks that include cooperation, meeting objectives within a set time, strategy and adaptability within dynamically changing game scenarios. Points are awarded as follows:

  - 3 points for winning the round.
  - 1 point for a draw.
  - 0 points for a loss.

- **Long-term scoring:** similar to league sports, teams accumulate points throughout all sessions, with the winning team at the end of the training period being the one that has accumulated the highest number of points.

Phase 6: The actual playing phase

After all the preparations comes the actual playing phase. This period involves regular gaming sessions where teams perform tasks designed to encourage their collaboration, strategic thinking and adaptability. The gameplay is designed as a series of challenges that teams must face in different scenarios, and they

are evaluated on their success and effectiveness in completing these tasks.

The adaptation process has three possible time variants according to the needs of the organisation:

- 3 months - 8x play: this option involves the longest duration of training and provides the greatest scope for development and repetitive practice, increasing the opportunity for participants to improve their cooperation and adaptability.

- 2 months - 6x game: the medium version allows enough training to show changes in team dynamics and adaptability, but with a shorter overall time commitment.

- 1 month - 4 times a game: the shortest option is designed for organizations that need faster training sessions, where participants need to effectively master tasks and demonstrate their skills in less time.

Within each of these variations, game sessions are organised at regular intervals to allow participants sufficient time to implement feedback and improve their skills between sessions. The game mechanisms and challenges are designed to foster team competitiveness and motivate team members to continuously improve.

Phase 7: Reflection and feedback (optional)

After each training session, participants will go through a process of reflection. This process will allow for deeper reflection on teamwork and individual contributions of team members, and the **Pulse Surveys** tool will be used to gather feedback. Reflection will take place on two levels:

Team reflection: team leaders and trainers will provide feedback on team cooperation and effectiveness in completing game tasks. Pulse Surveys will be used periodically to collect short questionnaire responses to help quickly identify team strengths and weaknesses. These assessments will be supported by video recordings of game sessions so that participants can review and analyze their performance based on specific situations.

The Pulse Surveys will include questions focused on team dynamics, such as:

- How do you rate the team‘s cooperation during today‘s session?

- Have there been any problems in communication or cooperation?

Team reflection will focus on improving collaboration, strategy and communication within the team.

Individual feedback: Each participant will receive individual feedback focused on their personal performance and contribution to the team through Pulse Surveys. This tool will allow each participant to quickly reflect on their abilities and behaviour within the team, with the opportunity to assess which aspects of their behaviour could be improved.

Examples of questions for individual feedback in Pulse Surveys:

- How do you rate your contribution to the team during today‘s session?

- What challenges did you face during the game and how did you deal with them?

- What could you do better in the next session?

The goal is to help each participant understand how their individual skills and behaviors affect the overall team dynamic.

The responses will be analysed by team leaders and trainers to identify areas where the team can improve its strategy and collaboration. Reflection and feedback are an essential part of the process as they allow participants to continuously improve and increase their effectiveness before the next game sessions.

Phase 8: Retest and evaluation of the level of social adaptation and inclusion

After the end of the game training program, a final retest of the level of social adaptation and inclusion of all team members will be conducted.

The aim of this retest is to evaluate how the individual team members adapted to the new dynamics and how efficiently the cooperation was during the whole training process.

The results of the retest provide valuable data for the HR department, which can use the data to analyze the effectiveness of the program and identify needs for further development of teams and individuals.

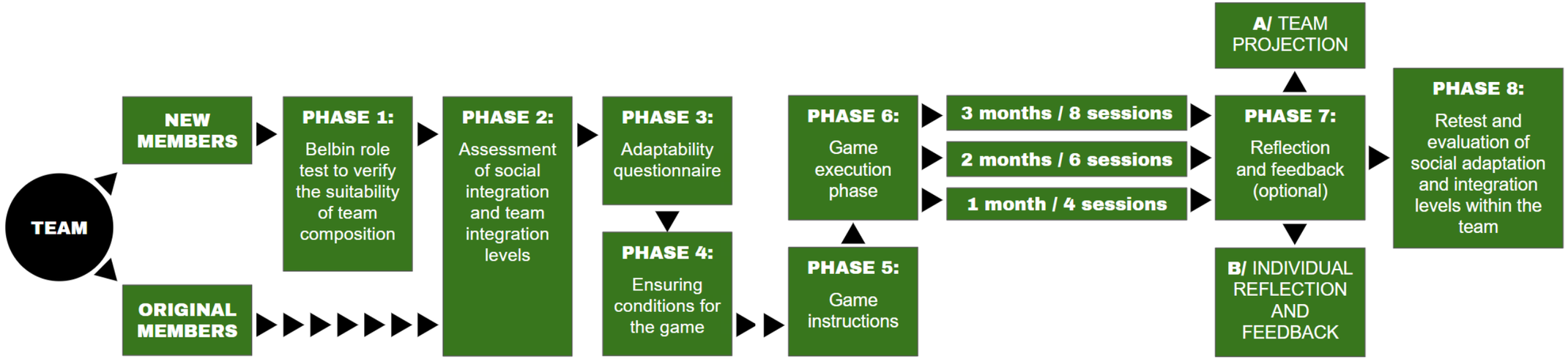

Fig. 4: Team Development Process

Key indicators for evaluation

The effectiveness of the methodology will be evaluated using the following key indicators, which provide a comprehensive overview of team dynamics, social acceptance and adaptability of individual team members.

a) Team cohesion: team cohesion is assessed by the quality of cooperation between team members, the effectiveness of joint decision-making and overall team cohesion. This aspect is measured by several specific indicators:
The team‘s game performance: An analysis of a team‘s game performance, which looks at how efficiently the team is performing tasks within the allotted time, using integrated game analytics.
Interaction patterns: how often and in what ways team members communicate and coordinate their activities. This data is collected by monitoring voice and written communication and analysing patterns of collaboration.
Participant feedback: feedback will be obtained after each training session via Pulse Surveys. This feedback will allow to assess how players perceive the quality of collaboration within the team and how they evaluate the decision making process.
Metrics: a combination of quantitative data (task completion time, solution success rate) and qualitative data from participant feedback will be used for evaluation. This data is analyzed and compared between sessions to track progress.

b) Social acceptance: focuses on the degree to which individual team members feel accepted by other members. This indicator is measured by:
Questionnaires: social acceptance is measured through questionnaires that are completed after each training cycle. The questionnaires assess perceptions of support and cooperation from other team members, using standardized instruments such as the Social Inclusion Questionnaire (SQ).
Team interactions: Specific interactions between team members that indicate mutual support and acceptance are observed, such as helping to solve problems, suggesting solutions, and involving all members in discussions.
Metrics: The evaluation focuses on questionnaire scores, looking at how social acceptance scores change over the course of the training process. Higher scores indicate improved social integration and support within the team.

c) Adaptability: participants‘ adaptability is a key indicator for measuring the team‘s ability to respond to unpredictable changes in the game environment and to adapt quickly to new situations. Adaptability assessment includes:

Adaptability Questionnaire (AQ): this tool is used to measure the flexibility of individual team members and their ability to adapt to new roles and tasks. The questionnaire provides quantitative data on the level of adaptability of each participant.
Responses to game changes: the game contains dynamic scenarios where players must quickly adapt their strategy to the changing context. Reaction times, success in tackling new challenges and the team‘s ability to reorganize in times of crisis are measured.
Metrics:Adaptability is evaluated based on a combination of questionnaire responses and performance metrics such as time efficiency, success of solutions after changes in game scenarios, and the level of involvement of individuals in adapting the team‘s strategy.

Together, all these indicators provide a comprehensive picture of the development of team dynamics, social interaction, and participant adaptability. The outputs from the individual measures are then analysed and serve as a basis for the further development of teams and individuals, allowing organisations to tailor training sessions as needed and optimise team effectiveness.

Possible applications outside business practice

Use in educational institutions: this methodology can be adapted to the needs of educational institutions, where it can serve as a means to develop students‘ teamwork and social skills.

Intergenerational training: the methodology can also be used in programmes aimed at improving teamwork between different generations of employees, thus promoting intergenerational communication and cooperation.

This methodology offers an innovative approach to developing team skills and social adaptability through competitive digital games. Its application in a business environment can significantly contribute to improving team dynamics, effective communication and collaboration, thereby increasing the productivity of teams in the digital age.

Conclusion

This scholarly monograph presented comprehensive research on the effective use of competitive digital games as a tool to promote team cohesion, social acceptance and adaptability, with a particular focus on members of Generation Z. Through a theoretical framework and practical research, we identified significant positive impacts of digital games on group dynamics, interpersonal relationships, and teamwork.

In the first part of the monograph, the basic theoretical concepts related to Generation Z, its digital literacy and specific behavioural patterns in the online environment were elaborated in detail. Based on the available literature and empirical studies, key factors that distinguish this generation from previous generations were identified, particularly in the areas of technology use, approach to teamwork and ability to adapt

to new challenges. It was highlighted that members of Generation Z tend to favour digital collaboration and fast communication, which makes digital games a suitable tool for developing teamwork and social skills.

In the next part of the monograph, a proposed methodology for the development and implementation of the Untitled Belbin MOBA Game (UBMG) was presented, which was created specifically to promote teamwork and adaptability in digital game environments. This game was designed based on Belbin's team role theory, ensuring that players learn different team roles that correspond to real work environments. The development of this game went through several phases, from conception to implementation to testing, and the results indicated that players who participated in the game sessions showed improvement in areas such as strategic thinking, communication, flexibility, and conflict resolution skills.

The experimental part of the monograph focused on a research study that took place over a three-month period, was conducted repeatedly to validate the results, and involved testing the control and experimental groups. The experimental group participated in regular gaming sessions where they were exposed to different game scenarios that required intensive teamwork and adaptation to new situations. The control group, which did not participate in the game sessions, served as a baseline for comparison. Results showed that the experimental group made significant improvements in the areas of team cohesion, social acceptance, and adaptability. Participants demonstrated a greater ability to communicate, a better understanding of team roles, and an increased readiness to solve problems in a team. The research monograph also provided a detailed analysis of the data collected during the gaming sessions, using a variety of methods including questionnaires, self-assessment tests and observations. These data confirmed that participants not only became better players, but also more capable teammates. An important part of the research was also looking at the long-term impact of games on social adaptability, where we found that games provided a space for the development of social skills that can then be applied in real work situations.

Based on the findings from the theoretical and practical part of the scientific monograph, we have created a draft methodology that can be applied not only in the academic environment, but also in business practice. This methodology provides a framework for the use of competitive digital games as a means to improve team dynamics, communication and adaptability, taking into account the specificities of Generation Z. The methodology is flexible and can be adapted to the needs of specific organisations that want to support the development of social and team skills of their employees.

In conclusion, competitive digital games are an innovative tool for developing teamwork and social skills, while bringing concrete benefits to the business environment. The results of this monograph offer important foundations for further research in this area and open up new possibilities for the application of digital games in training programs in the work environment. For further research, it is recommended to focus on the long-term effects of games on team cohesion and adaptability, as well as on the development of soft skills, which are essential for success in the digital era.

One of the main limitations of the research conducted is the relatively short period of time over which the gaming sessions were conducted. The three-month length of the intervention provided relevant data on short-term effects, but is not sufficient to examine in detail the long-term impacts of competitive digital games on social adaptability and team cohesion. Another limitation is the relatively small sample size of participants, which may affect the statistical significance of the findings. The group was predominantly made up of younger Generation Z individuals, which means that the results may be less relevant for older age groups or generations. It should also be highlighted that the research focused on competitive games, while other game genres (e.g. cooperative or simulation) were not investigated, which could have yielded different results.

Future research should focus on investigating the long-term effects of competitive digital games on team dynamics, social adaptability and individual soft skills development. It is suggested that longitudinal studies be conducted that follow participants over several years to identify the long-term benefits and potential drawbacks of game-based training. Another challenge is to extend the research to different age groups and work environments to better understand how digital games can support the development of team skills across generations. In addition, the impact of different game genres on team dynamics and social skills needs to be explored to broaden the application of games in different areas of education and job training.

Annex 1: UBMG satisfaction questionnaire

Dear students,

as part of the evaluation of the digital game you played with us, we would like to ask you to fill in the following questionnaire. The purpose of the questionnaire is to capture your feelings and justify your actions while playing the game. Your answers are important to us because they will help us both to improve the game and to make assumptions about the actions, thinking and settings of other players. All information collected is confidential and will be used for scientific purposes only.

Thank you in advance for your cooperation.

1. When you were choosing your role in the game (Bruiser - melee attack, Marksman - ranged attack, Ganker - observer, Healer - healer, Jungler - support), what did you base your decision on?

- I chose the one I liked the most.
- I chose the one I thought I could control.
- I chose the one that was left.
- I chose randomly.
- Other (please specify):

2. If you were to play the game again, what role would you choose?

- I would choose the same one again.
- I would choose another.
- I would choose another one, but I don‘t know which one.
- I don‘t remember the last role I chose.
- Other (please specify):

3. If you chose another role, which one? (no need to answer if you would choose the same one)

4. How did you play?

- I like playing digital games, so everything was great.
- I like playing digital games, but it took me a while to get the hang of the game.
- I like/love playing digital games, I played the game but didn‘t enjoy playing it.
- I have no relation to digital gaming, but everything was fine during the game.

- I have no relation to digital gaming, I didn‘t know how to navigate the game, but in the end it went smoothly.
- I don‘t relate to digital gaming, I didn‘t know how to navigate the game and I didn‘t know how to play the game.
- Other (please specify):

5. How did you work with your teammates in the game?

- Collaboration on the game was easy, clear and I worked well with my colleagues towards a common goal.
- The game was easy to play together, but I had technical problems at times.
- I wasn‘t quite able to work with my teammates towards a common goal.
- I didn‘t want to work with my teammates, I often played by myself.
- Other (please specify):

6. Who did you perceive as a leader during the game?

- One of the players on our team took the lead and coordinated us from the start.

- In our team I took the lead and coordinated the game from the beginning.
- We didn‘t have a leader in the beginning, he gradually emerged and coordinated us until the end of the game.
- We didn‘t have a leader, we were just arguing.
- We didn‘t have a leader, everyone in the team did what they thought was appropriate.
- Other (please specify):

7. Have you talked about the game outside of the game?

- Yes, we discussed the game outside of the game, during school.
- Yes, we discussed the game outside the game and we took advantage of the fact that we know each other.
- No, we didn‘t talk about the game, but we used the knowledge in the game.
- No, we didn‘t talk about the game and we didn‘t tend to communicate with each other outside the game.
- Other (please specify):

8. **Did you feel any stress during the game?**

- No, I like/love playing digital games, so I was looking forward to it.
- No, why should I?
- Yes, I was stressed until I learned how to control the avatar and understood the game system.
- Yes, I‘m always stressed at the start of a new game, but I gradually calm down.
- Yes, I don‘t play digital games and I didn‘t know what to do at first.
- Other (please specify):

9. What else would you add to the game to make it more collaborative?

(Open question)

Annex 2: Belbin Self-Assessment Questionnaire (Belbin 2010)

In each of the seven parts, divide the total of ten points between the possible answers according to how you think they describe your behaviour. You may divide these ten points equally or allocate them all to another answer. Write the points in the margin of the paper.

1. What I contribute to the team:

- I am quick to spot the benefits of new opportunities and know how to take advantage of them.
- I work well with a variety of people.
- Presenting ideas is one of my natural qualities.
- My skills lie in being able to encourage people when I find something that can make a valuable contribution to the group.
- My ability to continue projects is related to my personal effectiveness.
- I am willing to face temporary unpopularity when it eventually leads to valuable results.
- I can usually sense what is realistic and what is likely to work.
- I can offer alternative approaches without bias and prejudice.

2. If I have any deficiency in teamwork, maybe it's that:

- I am not happy when meetings are not well structured and not generally well organised.
- I tend to be magnanimous towards those who have a valid point of view that has not been properly heard.
- I tend to talk too much when the group moves on to new ideas.
- My objective outlook makes it difficult for me to promptly and spiritedly join my colleagues.
- Sometimes I am seen as powerful and authoritative when something needs to be done.
- It's hard for me to lead a team - maybe I'm hypersensitive to the group atmosphere.
- I'm able to get preoccupied with my own thoughts and stop watching what's going on.
- My colleagues tend to think that I worry too much about the details and the possibilities that we might not be successful.

3. When I'm involved in a project with other people:

- I have the ability to influence people without insistence.
- My general vigilance prevents mistakes of carelessness and forgetfulness.

- I am willing to do everything I can to ensure that time is not wasted in the meeting or that the main objectives are not lost sight of.
- I can be counted on to contribute something original.
- I am always ready to support a good proposal in the common interest.
- I like to seek out the latest ideas and discoveries.
- I believe that my sound judgment can help to make the right decisions.
- I can be relied upon to ensure that important work is always organised.

4. My characteristic approach to group work:

- I have a quiet interest in getting to know my colleagues better:
- I don't hesitate to confront other people's views or have a minority intention.
- I can usually find an argument to refute incorrect propositions.
- I think I have a knack for making things happen when there is a workable plan for them.
- I tend to avoid the obvious things and come up with the unexpected.

- All the work I start, I do perfectly.
- I am willing to use contacts outside of my own work.
- While I'm interested in all opinions, I don't hesitate to make up my mind when necessary.

5. I find the work satisfying because:

- I like to analyse situations and consider all possibilities.
- I am interested in finding practical solutions to problems.
- I feel that I foster good working relationships.
- I can have a strong influence on decisions.
- I can get along with people who can offer something new.
- I can get people to agree.
- I feel in my element when I can give my full attention to the task at hand.
- I like to find areas that expand my imagination.

6. If I was suddenly given a difficult task with limited time and unfamiliar people:

- I would feel like I needed to step back to find my way out of a dead end before I could find a direction.
- I would be prepared to work with the person who showed the most positive attitude.
- I would find out how individual people can best contribute to solving the task, and so I would find some way to make the task easier.
- My natural sense of urgency would help me to ensure that we do not get left behind the agenda.
- I would keep my cool and maintain my ability to think straight.
- Despite the pressures, I would stick to the original intention.
- I would be prepared to take a positive lead if I felt the group was not moving.
- I would open a discussion aimed at stimulating new ideas and getting things moving.

7. When I think about the problems I have working in groups, I see that :

- I am able to show impatience with other people who make it difficult to proceed.
- Perhaps others criticize me for being too analytical and not intuitive enough.

- My desire to ensure the job is done well can hold up progress.
- I easily lose interest and rely on one or two stimulating members to pull me along.
- I find it hard to get started when the goals are not clear.
- I sometimes poorly explain and clarify complex issues that come up.
- I realize that I want from others what I cannot do myself.
- I hesitate to assert my views against real opposition.

Make sure that the sum of the points in each set is ten and the total for the seven sets is 70.

Before you analyze the results of your self-assessment questionnaire, see if you are likely to agree with what you find. Belbin (2010) named each team role according to the functions needed for an effective team process. Read the brief descriptions of each role and rate them „a lot," „moderate," or „a little" based on how characteristic they are of you as a team member. All eight roles must be applied in a successful team, more or less depending on the role.

Fill in the following table and add up the totals to get your profile. Note that in this table the score is „decoded" and is not a simple sum of the scores. For example, if your scores in Part 1 were: a = 1, b = 4, d = 0, e = 1, f = 2, g = 0, and h = 0, then use the decoding table to get your first row:

Decoding table

Part of	R		K		F		I		VZ		H		T		D	
1	g	0	d	0	f	2	c	2	a	1	h	0	b	4	e	1

Now add up your score:

Evaluation table

Part of	R		K		F		I		VZ		H		T		D	
1	g		d		f		c		a		h		b		e	
2	a		b		e		g		c		d		f		h	
3	h		a		c		d		f		g		e		b	
4	d		h		b		e		g		c		a		f	
5	b		f		d		h		e		a		c		g	
6	f		c		g		a		h		e		b		d	
7	e		g		a		f		d		b		h		c	
Total:																

Note: Implementer (R) Coordinator (KR) Shaper (F) Innovator (I) Resource Seeker (VZ) Observer - Evaluator (H) Team Worker (TP) Completer (D)

Annex 3: Questionnaire to measure team cohesion and social inclusion

Use the following scale to answer:

(1) Completely disagree (2) Rather disagree (3) Almost disagree

(4) I almost agree (5) I rather agree (6) I completely agree

Questions:

- I feel like a full member of the team I belong to.
- In my team we support each other and pull together.
- We have a clear division of roles and responsibilities within the team, which improves our collaboration.
- I am respected for my contribution within the team.
- I feel sufficiently encouraged to express my ideas and thoughts within the team.
- In the team we openly discuss our views and differences of opinion.
- I feel safe in the team when I show my weaknesses or mistakes.
- I feel that my teammates appreciate my performance and the effort I put into the team.

- We have enough space in the team to express ideas and innovations.
- As a team, we can communicate effectively even during challenging situations.
- In my team, we have clear common goals that we are all working towards.
- I feel that we are well synchronized in the team and we work efficiently together.
- I am satisfied with the way conflicts are handled in our team.
- I am encouraged to come up with creative solutions within the team.
- I feel that our team is performing better than comparable teams.
- I feel supported in the team for personal and professional growth.
- I am satisfied with how the team responds to the challenges we face.
- I feel there is enough trust and open communication in our team.
- We acknowledge each other‘s strengths and weaknesses in the team.
- In my team, we motivate each other to achieve better results.

This questionnaire is designed to measure team cohesion, social inclusion and the team‘s ability to work together effectively and solve challenges. Each question contributes to the assessment of team dynamics and interactions among team members. Literature

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