LEVERAGING BELBIN ROLE MODEL AND BURTLE TEST FOR ENHANCING BUSINESS EDUCATION THROUGH GAMIFICATION: AN EMPIRICAL STUDY

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Abstract. This study explores how gamified learning experiences, combined with team role performance (e.g. Belbin's team role model) and player motivation profiles (e.g. Bartle test) can enhance feedback skills among students in entrepreneurship education. It examines whether this approach improves students' ability to give and receive feedback, contributing to their overall educational experience. The study involved assigning least preferred team roles and personality assessments while working on entrepreneurial case studies. The findings highlight patterns between gamer profiles and team roles, revealing gaps in feedback training. The study discusses how gamified approaches and tailored learning experiences can strengthen business education. Educators can gain a deeper understanding of the impact of students' profiles on team contribution and individual feedback skills, thereby tailoring educational approaches to better engage and empower future entrepreneurs.

Keywords: gamified learning; team role performance; player motivation profiles; education

Introduction

Gamification tools boost student's engagement and motivation in higher education (Mohd et al. 2023; Buckley & Doyle 2016; Deterding et al. 2011; Gamarra et al. 2021; Alabbasi 2017). By leveraging game-like elements such as simulations, role-playing, challenges, and reward systems, educators can not only increase engagement but also foster teamwork skills and a deeper understanding of business concepts, equipping students with lifelong skills to address the complexities of a rapidly changing work environment.

This paper delves into the intersection of personality assessment and gamification within the context of entrepreneurship education. The modern business bachelor's degree education, combined with gamification requires a multifaceted approach that goes beyond traditional classroom learning. Gamification, the integration of game-like elements into non-game contexts (Deterding et al. 2011), offers significant potential to engage students and foster a deeper understanding of concepts and improved academic performance. This paper explores the role of gamification as a driver for enhanced student engagement in business education, taking into consideration the team dynamics and roles played in the context of entrepreneurial education.

While gamification has been shown to increase student engagement, practical understanding (Kapp 2012) and innovation (Andonova et al. 2023), limited research explores its potential when combined with personality and team role assessments. This study addresses this gap by investigating the potential synergy between the Burtle test, which identifies player profiles, and the Belbin's team role model, which proposes a taxonomy of team roles. Through an exploratory study based on role model dynamics, we examine how these assessments can be leveraged to tailor gamified learning experiences in business education in the context of entrepreneurship, where the skill of feedback giving and receiving is fundamental to success.

The main research question is: How can gamified learning experiences, informed by team role performance (e.g., Belbin's team role model) and player motivation profiles (e.g., Burtle test, adapted for educational contexts), enhance the development of skills, in particular feedback giving and receiving, among students as a premise for effective business education in the context of entrepreneurship?

Traditional methods in business education may not fully address the development of essential teamwork skills needed for success in entrepreneurial ventures. Gamified learning, with its emphasis on competition, collaboration, and achieving goals in highly unstructured situations, presents a potentially powerful tool for fostering these skills. Additionally, taking on challenging team roles can highlight individual strengths and weaknesses within team dynamics. This is especially important for the success of entrepreneurial projects where 65% of startups fail due to interpersonal conflicts within the founding team (Wasserman 2013). Moreover, player motivation profiles can provide insights into how students are most likely to engage and learn within a gamified environment and on this basis seek implications regarding their behavior in entrepreneurial teams.

From a pedagogical perspective, administering the Belbin's team role model (adapted to a team of five) and the Burtle test (tailored to gamified learning environments) can provide data for both educators and students. The team formation and role assessments within the gamified environment can ensure a mix of appropriate roles, enhancing the understanding of the division between the self and the role assigned to each team member. The gamification design and elements

like clear goals, leaderboards, collaborative problem-solving tasks, and opportunities for open-ended exploration, can be incorporated based on player motivations. Reflection and constructive feedback from the post-game discussions can encourage students to reflect on how their individual strengths, team dynamics, and the gamified environment contributed to their learning experience and build awareness about the separation between the role and self of each player, strengthening a lifelong skill (Dahalan et al. 2024) such as feedback giving and receiving.

We explore the potential for a powerful synergy between the Burtle test, which identifies player profiles in games, and the Belbin's team role model, which categorizes team roles. Through an exploratory experimental study, we investigate how these assessments can be leveraged to improve entrepreneurship education using gamified learning experiences geared toward the development of feedback giving and receiving.

In this study we employed a role play game to investigate group dynamics and feedback giving and receiving skills within the context of business administration education, in particular, entrepreneurship. While the experiment utilizes a relatively homogenous sample of 24 second-year bachelor's degree students from Sofia University "St. Kliment Ohridski", the chosen theoretical frameworks can still provide generalizable insights despite the limitation of sample size and specific cultural context.

Our research involved administering both the Burtle Test and Belbin Team Role assessment to students, challenged by solving a time-constrained entrepreneurial task that represents a recent dilemma faced by technology-driven European startups. By analyzing the results, we aim to gain a deeper understanding of individual student preferences and strengths regarding team performance and specifically, feedback giving and receiving. Using a somewhat limited sample, the findings reveal patterns between identified gamer profiles and team role preferences and aversions, suggesting potential correlations in how individuals approach challenges in both gaming and teamwork contexts related to entrepreneurial education.

We discuss the importance of team formation and the role of feedback giving and receiving for entrepreneurial success as well as the importance of developing engaging gamified learning experiences. By integrating the Burtle Test and the Belbin Team Role Model, we gain a more nuanced understanding of students' profiles and behaviors to support the acquisition of lifelong skills. The insights can help tailor educational approaches that better engage and empower students of entrepreneurship and business domains.

The rest of the paper is organized as follows. In the following section we succinctly describe the theoretical foundation and the main characteristics of the Belbin's team role model (Belbin, 1993) and the Burtle test (Burtle, 1996). Then we present the methodology, Next, the empirical results are described, and we discuss their implications. The final section concludes.

1. Theoretical Framework

Belbin's team role model is a tool for understanding and optimizing team dynamics (Belbin 1993). In organizational contexts, Belbin's management roles are intended to provide guidance to decision makers about building balanced teams capable of conducting honest review and assessment of team contribution using depersonalized conversations and effective feedback. The model categorizes individuals into nine distinct roles, each with unique strengths and weaknesses within a team environment. Belbin's managerial roles are defined as follows:

Action-oriented roles

Implementer: The implementer is essential when practical steps need to be planned effectively. She gets things done but might be inflexible or resistant to unproven or experimental ideas.

Completer-finisher: She becomes most visible at the end of a task when she takes the lead for polishing up the results and checks the outcome for possible mistakes. She is a perfectionist but might not like to delegate.

Shaper: The shaper is a person with a drive and courage to overcome obstacles. She formulates the demands and the focus for the team not to deviate from the objective. She is open minding and dynamic but often impatient.

People oriented roles

Coordinator: She supports the team members in taking on tasks according to their strengths. She is confident but might not be creative.

Resource investigator: She spreads the team's ideas to the outside world and builds valuable support networks. She is a strong communicator but too optimistic.

Teamworker: She helps the team to function harmoniously by reducing friction. She is considerate and willing to work for the benefit of the whole team but is indecisive in critical situations.

Knowledge-oriented roles

Plant: She tends to be very creative and comes up with unconventional solutions and new ideas to problem solving. She might be lost in thought.

Monitor-evaluator: She brings logic to inspect the feasibility of proposals arising within the team. She has strategic vision but is sometimes too dispassionate.

Specialist: She brings specific knowledge and information to the problem solution. The specialist is focused on a specific domain and often gets lost in detail.

Inspired by Belbin's taxonomy, we developed a simplified team role model geared towards the specific context of entrepreneurship, where startup teams rarely exceed five (Andonova et al. 2019). Moreover, entrepreneurial development relies not so much on specialists but more on generalists who can take upon several related roles. Thus, we simplify the taxonomy of nine roles, categorizing them into the three main areas as originally defined (Belbin 1993), and propose five distinctive roles. These are intended as a more realistic approximation to entrepreneurial team composition and respond to the need for a less complex framework suitable for learning and training

purposes. We propose the following five roles (the original Belbin's roles in brackets):

1. Innovator (Plant and Shaper) who "thinks outside the box," challenging traditional approaches, and generating creative ideas.

2. Coordinator (Coordinator) who prioritize organization, team and time management.

3. Implementer (Implementer and Completer) who turns ideas into action and takes the initiative.

4. Expert eye (Specialist and Monitor) who brings expertise relevant to the team's task.

5. Diplomat (Teamworker and Resource investigator) is in charge of maintaining a harmonious team environment and supporting others.

The Burtle test, developed by Richard Burtle (1996) is a prominent tool in the field of game studies used for understanding player motivations in multiplayer online games (such as massively multiplayer online games, MMO and multi-user domains, MUD). It categorizes players based on their preferred in-game activities and underlying psychological drives. This framework provides insights for game designers who can leverage this knowledge to create more engaging experiences that cater to diverse player types. This framework focuses on player motivations within multiplayer games, identifying the following player types: Achievers (goal-oriented), Explorers (discovery-driven), Socializers (relationship-focused), and Killers (competition-driven) (Burtle 1996). While primarily used in game design, Burtle's player types can offer initial insights into student motivations within a gamified learning environment, a topic that has not been systematically explored.

Methodologically, the Burtle test typically employs a series of statements where players choose the option that best reflects their in-game preferences. Based on their responses, players receive a percentage score in each category, indicating their dominant player type. However, it's important to recognize that players often exhibit characteristics from multiple types to varying degrees, forming a spectrum rather than pure distinct categories (Przybylski et al. 2014).

The Burtle's player types categorize individuals based on their tendencies and preferences within a particular environment. In our case, the environment is second years of Business Administration students. The Burtle test, although with its limitations, provides a framework for understanding player motivations in multiplayer games. We conjecture that in combination with a role-play game designed according to an adapted and simplified version of the Belbin's team roles, more engaging and transformational learning experiences can be designed for improved entrepreneurial training and education. The awareness about team roles and the ability to give and receive depersonalized feedback regarding team contribution represents a lifelong skill with high value application in entrepreneurial and business environments (for a high impact application in entrepreneurial coachability) (Somia et al. 2024).

2. Methodology

This study employed a feedback role play game to explore and train feedback giving and receiving in the context of business administration education and more specifically entrepreneurship. Twenty-four second-year bachelor's degree students from Sofia University "St. Kliment Ohridski" participated in the experiment, divided into groups of five, according to a negative self-selection process of five roles as per Innovator, Coordinator, Implementer, Expert Eye and Diplomat.

Selecting students from the same year and program offers several advantages. First, it fosters a relatively homogenous group in terms of educational background and potentially similar prior experiences related to feedback giving and taking. This helps control for external variables and strengthens the internal validity of the experiment, thus, the results are more likely to occur due to the intended experimental design, not due to the pre-existing differences among participants. Second, focusing on business administration students aligns well with the game's focus on group dynamics and feedback giving and receiving skills, crucial for success in this field, specifically in the context of entrepreneurship.

The role play game design draws inspiration from the concept of player models in game-based learning environments. Similar to how player models categorize players based on motivational drives in games (Burtle's model), assigning specific roles within the feedback game aimed to explore how individuals placed into their least preferred team roles learn to receive and give feedback to others who are similarly placed into their least comfortable roles.

In total 24 participants were given a lecture on the importance of team dynamics for business and entrepreneurial success, including a detailed presentation on the simplified Belbin's team role taxonomy. At the end of the lecture students were asked to report their most and least preferred team roles. Then they were organized into four groups of five (20 students), the four remaining students acting as facilitators to enhance data collection. To ensure balanced group roles, the sole criterion to place a student into a team was to play the game from the declared least preferred team role (Innovator, Coordinator, Implementer, Expert Eye, Diplomat). This approach ensures that each student receives feedback about her performance in a somewhat challenging role play experience and provides feedback to others who play under the same condition. Following prior instructions, including a detailed time management table, the case materials and the feedback templates for each role, each one of the four student facilitators was assigned to a team.

Students received feedback templates in which they wrote the name of all team members and their assigned roles. The five playing students and the facilitator were seated into a close-knitted circle. The facilitator read the text of a short case study (300 words), describing an entrepreneurial challenge faced by a real European startup. A possible action plan was requested as the only outcome of the role play game. A time

limit of 10 minutes was enforced by the facilitator. After the end of the ten-minute discussion, the proposed action plan was verbally explained by the Coordinator and written down by the facilitator, who read the epilogue of the case to update the players on the preferred action choice by the startup team featured in the case. Next, dedicated feedback round followed, where each team player had to formulate the strengths and weaknesses of her/his peers in relation to their performance according to the assigned role. The facilitator concluded the feedback round sharing his/her feedback as an outside observer. During this round, participants adhered to pre-defined guidelines about feedback tailored to each role. A second round of the game was played preserving the assigned roles, initiated by the reading of a new short case study and concluding with a feedback round.

Finally, all participants completed a post-game form. The form addressed the perceived value of the game, a self-evaluation with socio-economic parameters and a quantitative assessment of each player in his/her assigned role, using a 5-point Likert scale. To ensure objectivity, the template also included qualitative evidence to support the reported Likert scale score, emphasizing factual language and specific examples to substantiate the reported strengths or areas for improvement for each player. The template explicitly discouraged personal references and subjective statements such as "Your/My", "I feel" or "I think" in favor of factual feedback regarding team contribution given the assigned (the least preferred) role of each player.

The data collected from the post-game forms, including the feedback provided by the facilitators is analyzed in the next section.

By incorporating self-evaluation and peer-assessment instruments, the game focused on the experience of feedback giving and receiving. This closing loop aligns with the principles of learner models, which emphasize the importance of targeted feedback to enhance the learning process. The role game integrates elements from both player models and learner models within a game-based learning context. By assigning roles and fostering constructive feedback through a structured template and a feedback process, the game offers an opportunity to evaluate the learning experience for participants in the specific context of business and entrepreneurship education, similar to how game flow optimization enhances both gameplay and learning outcomes in educational games.

Following the completion of the postgame forms, the exploratory study proceeded with the implementation of the Burtle test. This psychometric instrument categorizes players in multiplayer games based on their motivational drives (Achiever, Explorer, Socializer, Killer). Administering the Burtle test allowed to identify participants' dominant player types and explore how these individual motivations might influence their performance and overall experience in the feedback game. By matching player types with assigned (least preferred) team roles, the experiment aimed to investigate potential synergies between player motivations and feedback giving and receiving skills within the game's structure.

The pre-experiment measures include role preference (the most and the least preferred) based on the simplified and adapted Belbin team role model as well as role assignment (the least preferred role). In-game data collection captures aspects of perceived performance of each player within the assigned role. Additionally, the game development was supported by two experimenters as guarantors for the smooth and correct development of the feedback game. The post-game surveys are individual surveys meant to capture participants' perceptions of each players' performance within the assigned roles, the overall game experience and value as well as socio-economic data related to the exposure to entrepreneurial behavior.

By collecting data through these methods, we aim to gain a comprehensive understanding of how the assigned Belbin roles, group interactions, and feedback mechanisms influenced feedback giving and receiving within the context of business administration education. In the next section we report the results of the systematic analysis. The analysis techniques employed provide a comprehensive overview of the dataset, highlighting key patterns and relationships. Descriptive statistics and data visualization offer summaries and suggest potential associations within the data.

3. Results

The study employed a group of 24 participants, divided into four groups of five players. Additionally, one facilitator per group was present. Two observers (experimenters) ensured the smooth development of the game. While group formation occurred spontaneously in relation to the least preferred role, the resulting sample achieved a balanced gender distribution with 50% male and 50% female participants. All participants were second-year students. The age range for the sample was primarily between 21 and 25 years old, with three participants falling outside this range at the age of 20. This balanced distribution is beneficial for examining gender-related differences in motivations and preferred roles. A younger demographic can potentially offer unique perspectives and motivations regarding feedback giving and receiving.

According to the responses to the post-game survey a significant majority of participants (71%) consider the skill of feedback giving and receiving important and 21% rate it as very important. This indicates a generally positive attitude towards the skill of feedback giving and receiving within the group, with a strong recognition (92%) of its importance. Despite this positive attitude, slightly over half of the participants (54%) did not receive training on giving or seeking feedback. This gap highlights an area for potential improvement in their professional development programs. The majority (62.5%) of participants had experience with giving or receiving feedback in real-life situations. This suggests that the exercise could leverage a strong foundation of shared experiences when discussing the practical application of feedback skills.

Over half of the participants reported (14 students) knowing someone who had recently started a business. This suggests that entrepreneurship may be a

relatively common pursuit among the social circles of the students. There is a high number of non-responses (41.7%) suggesting that some participants didn't know anyone who had started a business, or that they were uncomfortable answering the question.

Most students found the feedback game applied to an entrepreneurship context highly useful, rating it between 4 and 5 on a five-point Likert scale. They appreciated the opportunity to receive constructive criticism, which was perceived as instrumental in their personal and professional development. Comments such as "The feedback helped me identify areas for improvement and understand my strengths better" are common. A share of students rated the exercise as moderately useful, giving it a 3. These students recognized the benefits of feedback but felt that its impact was limited. For instance, one student noted, "It was useful, but I believe more detailed feedback could have been provided". A few found the exercise less or not at all useful, rating it 1 or 2. These students felt that the feedback was either too general or not delivered effectively. As one respondent mentioned, "I did not find the feedback very useful as it was too general".

When considering the usefulness for their peers, most students rated the game high, observing that their classmates also benefited significantly from constructive feedback. However, it was noted that the impact varied, with some peers not taking the feedback seriously. Overall, the feedback game was generally perceived as beneficial, underscoring its importance in enhancing both personal and teammates' skills. These insights suggest that refining feedback to be more specific and actionable can further improve its effectiveness in educational settings.

The Burtle test provides an alternative lens to evaluate participants' game experience, categorizing them as players in a gamified environment. This perspective can help calibrate the feedback results regarding skill development according to the player's motivation. Participants identified as "Achievers" and "Explorers" in the Burtle test, for example, may exhibit a natural inclination towards seeking and providing feedback due to their goal-oriented and discovery-driven motivations. This can correlate with the positive attitudes towards feedback, reinforcing the importance of feedback across different environments.

Arguably, the Burtle test can also reveal discrepancies in feedback training and experience. For instance, participants who identify as "Socializers" might place a higher value on communication and feedback in both real-life and gamified contexts. By examining these cross-environmental responses, educators can better understand the nuances in feedback perceptions and identify specific training needs.

The feedback game influenced the reported personal growth of students. According to the post-game survey, it not only helped students recognize their strengths but also made them more aware of their weaknesses. For example, one student noted, "The feedback game highlighted my ability to lead and organize tasks efficiently, which I hadn't fully appreciated before". This recognition of strengths is essential for personal

growth, as it empowers students to leverage their abilities in future projects and careers. Moreover, the game had a significant impact on students' attitudes towards feedback. Many reported becoming more open to seeking and giving feedback, understanding its value for personal and professional development. As one student shared, "The game made me realize the value of feedback, and now I'm more inclined to seek it out and provide it constructively".

Students also reflected on how feedback had helped them improve skills or behaviors. For instance, feedback on presentation skills led one student to work on their public speaking, resulting in significant improvement in subsequent presentations. Another student mentioned, "The feedback pointed out my tendency to overlook details, which made me more conscious of this habit and motivated me to work on it." Such awareness is critical for fostering a growth mindset and encouraging continuous improvement.

Many students reported positive changes in their understanding and approach to teamwork as a result of the feedback game. For example, a student noted, "I've become more open to others' ideas and more proactive in offering constructive feedback, which improved our team dynamics during the case discussion".

Finally, students expressed intentions to incorporate the lessons learned from the feedback game into their future projects and careers. They emphasized the importance of continuous improvement and effective communication. One student articulated, "I plan to regularly seek feedback in my future projects to continuously improve and ensure I'm meeting the expectations of my team and clients".
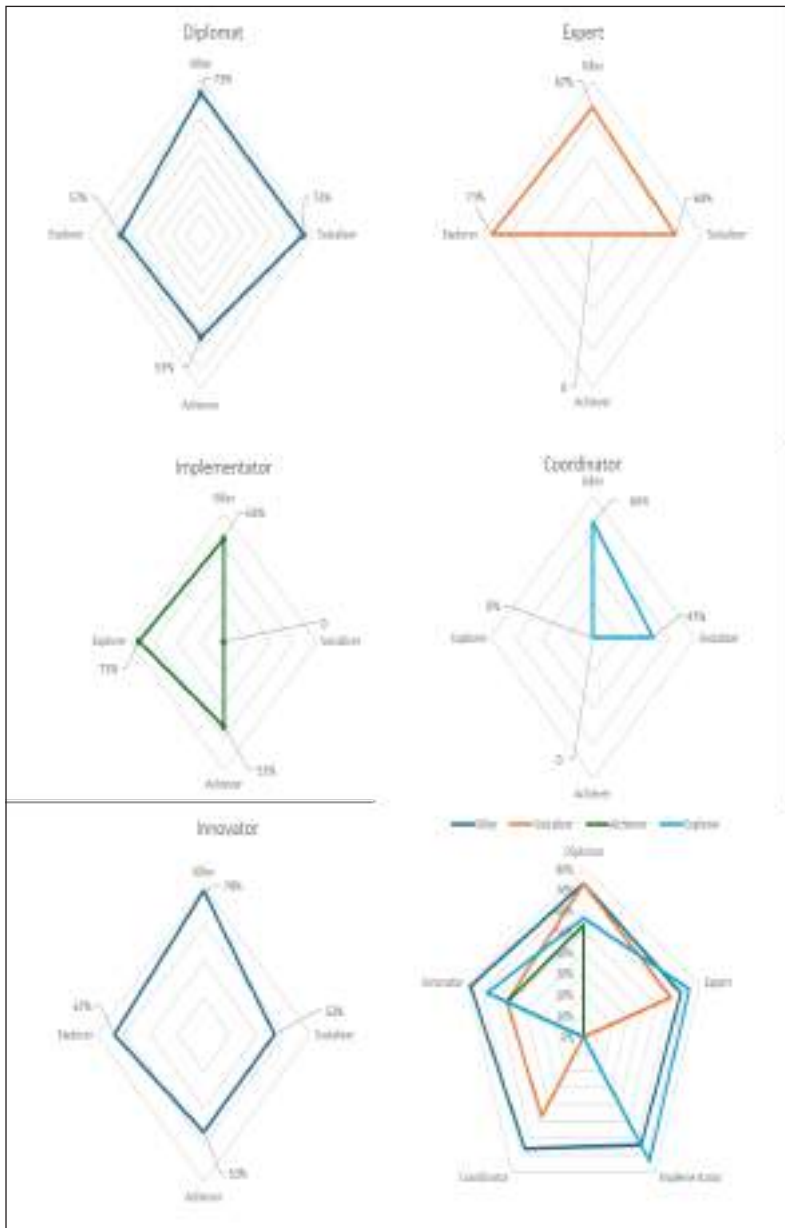
Therefore, the feedback game was well received and appreciated by students. It helped them recognize their strengths, become more aware of their weaknesses, and make positive changes in their approach to teamwork and feedback giving and receiving. These findings underscore the value of incorporating regular training on feedback giving and receiving in educational curricula to foster personal and professional growth, preparing students for the complexities of the real world. Gamification appears to be particularly suitable to this end.

In this regard, a second game-related instrument, the Burtle test was applied to uncover players' motivations.

Table 1. Cross-table between the Belbin's role models
and Burtle's dominant player types of 20 students

	Diplomat	**Expert**	**Implementer**	**Coordinator**	**Innovator**
Group 1	Explorer	Socialiser	Killer	Socialiser	Explorer
Group 2	Socialiser	Killer	Explorer	Killer	Killer
Group 3	Explorer	Explorer	Killer	Killer	Socialiser
Group 4	Killer	Explorer	Killer	Killer	Killer

Source: Own elaboration.

Figure 1. Belbin's team roles and Burtle's player types

An analysis of Burtle type distribution among second-year Business Administration students revealed that the "Killer" type is the most prevalent, with 10 out of 24 students identifying as such (see Table 1). This represents a significant portion of the sample, indicating a highly competitive motivation among the students. The other Burtle types – "Socializer", "Explorer", and "Achiever" – are significantly less frequent. The presence of unspecified types – players with at least two almost equally strong dominant profiles – also adds to the diversity of player motivations within the group.

The dominance of the "Killer" type is an unexpected outcome that merits further investigation. This type is characterized by a competitive drive and a focus on winning, which can significantly impact team dynamics and learning outcomes. The presence of "Explorer" and "Socializer" types, accounting for 30% and 20% of participants respectively, indicates a varied range of motivations that can contribute to a well-rounded learning environment. Interestingly, the "Achiever" type was not frequent, contrary to expectations that in an educational setting focused on goal attainment and performance such motivations are prevalent.

As reported in Table 1, students whose least preferred team roles (to which they were assigned) were Coordinators and Implementers, frequently identified themselves as "Killers" This finding suggests a possible correlation between discomfort with adopting the roles of Coordinators and Implementers and a competitive mindset, which could be also influenced by the demographic profile of the sample. Given that most participants are in the 21 to 25 age range, their developmental stage and external influences might also play a role in showing weaker preferences to coordination and implementation as team functions.

Diplomats and Innovators are equally uncomfortable team roles for all types of player profiles both when we consider the dominant player tendency shown in Table 1 or the dominant and the complementary ones, as shown in Figure 1. Diplomats emphasize relationships and maintaining harmony whereas Innovators focus on creativity and discovery. Weaker student preferences for taking on the role of Innovators and Diplomats might be a warning signal for educators to strive to provide more comfort with innovation and experimentation in educational programs. This might also indicate a need to enhance the focus on team balance and cooperation rather than on promoting competitive dynamics, which seem to be disproportionately prevalent in business education.

The combination of Belbin's team role model and Burtle test to monitor the impact of the feedback game provides insights on students' attitudes to feedback giving and receiving as well as on their motivations. Such insights enable educators to structure learning activities effectively, fostering better collaboration, communication, and overall learning outcomes in the context of business and entrepreneurship education. By placing students in less preferred

team roles and uncovering motivational insights, educators can optimize learning experiences and prepare students for real-world business environments, perfecting the lifelong skill of feedback giving and receiving.

4. Discussion

This exploratory study acknowledges the limitations inherent to the Burtle Test when applied to the specific current context. Primarily designed for multiplayer online games (MMOs), the test might not fully capture the nuances of player motivations within a controlled educational setting. Additionally, its reliance on self-evaluation introduces potential biases, as participants may not always be entirely accurate in assessing their own preferences.

Furthermore, applying a model focused primarily on player motivations in online games to a controlled educational environment presents potential shortcomings. The gamified learning context, while drawing inspiration from game mechanics, differs significantly from the free-form exploration and competition often characteristic of MMOs.

To address these limitations, we employed a two-pronged approach. First, the Burtle test was used in conjunction with the feedback game. This combined assessment strategy aimed to gain a more comprehensive understanding of player motivations within the specific context of gamified learning. By analyzing both self-reported preferences and actual behavior within the game environment, we sought to create a richer picture of student motivations, collecting quantitative and qualitative data.

Second, the study incorporated team dynamics through the feedback game itself. This enriched the data collection process by capturing team-based interactions and self-reported perceptions. Analyzing how assigned Belbin roles, group dynamics, and feedback mechanisms within the game influenced these aspects provided insights beyond individual player motivations independent of the Burtle test.

Regarding the sample size of twenty-four participants, while a relevant starting point for investigating group dynamics within business administration and entrepreneurial education, it might limit the generalizability of the findings to the wider student population. A larger sample size would allow for a more robust statistical analysis and ultimately provide stronger evidence for the conclusions drawn. Still, even with this relatively coarse data, there are patterns that are worth further study. In addition, the theoretical frameworks at the core of this experimental study enhance the generalizability of the suggested relationships.

Future research could a larger and more diverse group of participants. This would strengthen the generalizability of the results and allow for a more nuanced understanding of how player motivations and team dynamics

interactions within gamified learning environments across different student populations. Additionally, exploring adaptations of the Burtle test or developing a new instrument specifically tailored to assess player motivations in gamified learning could provide more precise data on student preferences within the specific educational context.

Research on pedagogical tools for use in entrepreneurship education reveals that games can be an effective teaching method in class (Kauppinen & Choudhary 2021). Building upon the work of Lyons et al. (2023).Our findings confirm that perceived learning and perceived engagement remain the two main factors influencing the effectiveness of gamification in entrepreneurial education.

5. Conclusions

To the best of our knowledge, a similar study combining the profile and motivation of learners has not been found in the scientific literature of gamified educational tools. Despite all the limitations discussed above, our approach combines group evaluation with self-evaluation within a gamified setting in the context of extrepreneurship. The results suggest that most of the students identify themselves as solo players and with profiles of "Killers", consistent with their discomfort in taking on team roles as Coordinators and Implementers.

The key findings reveal that the majority of participants (92%) recognized the importance of feedback skills and appreciated the opportunity to receive constructive criticism within the game environment. The feedback game was perceived as beneficial by most students, leading to increased self-awareness of strengths and weaknesses. Students reported a shift towards a more open and growth-oriented mindset regarding feedback. The conducted game facilitated improvements in self-reported teamwork skills and communication. The unexpected results that need special attention is the dominance of the "Killer" type in the Bartle Test, indicating a strong competitive self-centered motivation among participants. Further research is needed to explore the reasons behind this prevalence and its potential impact on learning outcomes and entrepreneurial success. The study could also benefit from a larger and more diverse sample to enhance the generalizability of the findings.

The combined use of Belbin team roles and the Bartle Test provides valuable insights into student motivations and team dynamics. By incorporating regular feedback training and gamified learning experiences that cater to diverse player types, educators can foster a more collaborative and growth-oriented learning environment. This can better prepare students for the complexities of communication and feedback exchange in real-world business settings.

This exploratory study on gamified learning for business and entrepreneurship education can enhance the curriculum design, team

formation, and the development of engaging learning experiences and skill building. By integrating an adaptation of the Belbin's team role model and insights from the Burtle test educators can create a more multifaceted and effective learning environment, promoting lifelong skills such as feedback giving and receiving.

This study, despite the acknowledged limitations of the Burtle test and the relatively small sample size, employed a well-structured approach to investigate group dynamics and improve feedback giving and receiving within the context of business administration and entrepreneurial education. By integrating the Belbin's team role model and insights from the Burtle test enable educators to create a more nuanced and engaging learning experience. This approach caters to diverse student motivations and feedback-related skills, fostering a richer educational environment that better prepares students for real-world challenges related to team dynamics. The findings suggest that this combined assessment strategy can significantly enhance the effectiveness of gamified learning experiences by aligning educational activities with individual motivators and team outcomes, in favor of developing a lifelong skill such as feedback giving and receiving.

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