

# With or Without You: A Comparison of Single and Multi-Player Game-Related Assessments

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**Abstract:** As gamification transforms recruitment processes, understanding how different types of *game-related assessments* (GRAs) affect candidate experience becomes crucial. This study investigates candidate responses to two distinct GRA formats implemented in a large-scale, real-world recruitment process for international interns in the food and agriculture sector. The first tool, ClusterMind, is a fully automated game-based assessment requiring individual gameplay. The second, The Collectors, is a collaborative game embedded in an online assessment centre format with real-time interaction among candidates and human assessors observing the gameplay. Data were collected from 434 participants across three consecutive years, including survey responses and open-ended feedback. Results reveal that both assessments were rated favourably, with The Collectors receiving significantly higher ratings ( $M = 8.91$ , on a scale 1-10) compared to ClusterMind ( $M = 7.52$ ), despite being perceived as slightly more difficult. Qualitative analysis confirmed that candidates valued the opportunity for social interaction, teamwork, and self-expression. These aspects appeared to mitigate the perceived pressure of being assessed, fostering a more enjoyable and authentic experience. Additionally, comparison with traditional assessment centre organised in the same recruitment project in previous years illustrates the operational benefits of GRA. Fewer organizational resources are needed, less work time, and greater scalability is available. The number of assessors employed in the process dropped from 90 to 32 in the first year of gamification implementation and 27 in each of the following two years. This research expands the literature on GRAs by evaluating not only different game formats but also the broader recruitment experience. It provides practical implications for organisations and game developers. It supports the notion that different GRA types serve different purposes and that the social context of assessment plays a vital role in candidate engagement. More immersive, automated GBA offer greater scalability and cost-effectiveness, while assessment centres with games as assessment tasks may result in even better candidate experience. Findings encourage the use of blended GRA formats that balance automation with human interaction.

**Keywords:** Game-Related assessment, Game-Based assessment, Human interaction, Gamification, Assessment centre

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## 1. Introduction

The *Assessment Centre* (AC) has been used in personnel selection since at least the 1950s and remains a widely adopted method for evaluating candidates' potential for managerial and developmental roles. Its validity has been well-documented, with early meta-analyses confirming its effectiveness in predicting job performance (Gaugler et al., 1987).

However, traditional ACs are resource-intensive and logistically complex. A typical session requires a dedicated team of trained assessors, carefully designed assessment materials, and infrastructure such as observation rooms and breakout spaces. These sessions are usually conducted in person and often last several hours or even days, leading to additional costs associated with travel and accommodation. As a result, many organisations have sought more efficient, scalable solutions that retain the diagnostic depth of ACs while reducing time and cost burdens.

One such approach is the use of *game-related assessments* (GRAs), which incorporate elements of gamification into selection procedures. There are numerous published examples of psychometrically valid game-related assessments. GRAs are designed to improve candidate experience (Georgiou & Nikolaou, 2020) reduce faking (Landers & Collmus, 2022) and increase scalability through digital formats and automation (Marengo & Pagano, 2020). The method is used by public and private organizations, and even US Air Force (Wiernik et al., 2022).

GRAs vary in their level of playfulness. The simplest, *soft-gamified assessments* are traditional methods, such as questionnaires, surveys, and situational judgement tests with added game mechanics. *Hard-gamified assessments* (also referred to as *gamefully designed assessments*) have game elements embedded within them in such a way that they cannot be removed without rendering the tool unusable. The most elaborate tools are *game-based assessments* (GBAs). These may incorporate elements of traditional assessments, but the gameplay effectively conceals the assessment aspect, offering a level of immersion comparable to that of commercial entertainment games (Ramos-Villagrana & Fernández-del-Río, 2023).

Despite the growing interest in GRAs, most research has focused on relatively simple, early-stage digital assessments rather than more complex or socially interactive formats. Furthermore, little is known about how

candidates experience different types of GRAs, particularly those that differ in the degree of automation and human involvement. This is a timely issue, as many organisations are increasingly introducing AI-supported assessments and replacing human evaluators with algorithmic decision-making. Emerging research suggests that these shifts may have unintended consequences for candidate perceptions.

Studies indicate that applicants tend to view human-based or hybrid selection procedures more favourably than those where assessment is based solely on algorithms. AI-driven interviews, for example, have been found to reduce successful applicants' self-efficacy and increase concerns about procedural fairness (Cui et al., 2025), and reduce procedural fairness scores when rejections are issued by an algorithm (Bedemariam & Wessel, 2023).

Köchling et al. (2022) found that AI-supported interviews increased feelings of "emotional creepiness" and reduced perceptions of opportunity to perform, both of which mediated the negative effects of AI on organisational attractiveness. The effect was observed in later stages of the selection process, but not on the earlier stages such as preselection. Similarly, Gonzalez et al. (2021) showed that participants reacted more positively to augmented (human-AI hybrid) and fully human approaches, particularly when they had low familiarity with AI. Attributions of organisational intent is supposed to play a key role in shaping reactions: algorithmic decisions were associated with cost-cutting and exploitation, whereas human decisions signalled commitment to applicant well-being and quality enhancement (Koch-Bayram & Kaibel, 2024).

These findings suggest that not all digital or gamified assessments are perceived equally. Even within GRAs, the degree of human interaction may significantly affect candidate experience. This study examines such differences in a real-life selection context, where two game-related assessments were used as part of an early career recruitment programme. The first tool, ClusterMind, was an individual, automated video game administered online without direct human involvement. The second, The Collectors, was a group task involving live collaboration among candidates and observation by trained assessors in a virtual setting.

The study had two main goals. First, to compare the efficiency and scalability of these tools against a traditional AC format previously used by the same organisation. Second, to explore candidate reactions to both GRA tools, using both quantitative feedback (ratings and difficulty scores) and qualitative feedback (open-ended responses). By examining differences in perception and engagement, this study contributes to the growing literature on GRAs and offers practical implications for organisations seeking to modernise their selection procedures without sacrificing candidate experience.

## **2. Method**

### **2.1 Recruitment Process**

This study examines an annual international recruitment process for an internship programme abroad, co-financed by the European Union. Its primary aim is to facilitate connections between students and organisations in the food and agriculture sector.

The programme is open to students, doctoral candidates, and recent graduates from 25 countries across Southern, Central, and Eastern Europe. Data from selected applicants are shared with the organiser's partners—such as corporations, start-ups, and research institutions based in the EU, who then select future interns from this pre-screened talent pool. Data is reported on the recruitment processes as conducted annually from 2022 to 2024.

The recruitment process is designed to identify promising candidates with limited professional experience. In such cases, CV reviews alone are inadequate for assessing potential. Although a traditional assessment centre was previously employed to evaluate several soft skills, it was considered time-consuming and not engaging. Gamification was proposed to address these limitations.

Two different GRAs were implemented to evaluate candidates' competencies. One was a single-player, online video game, which automatically measures soft skills, ClusterMind. The second, The Collectors, was an online group task delivered via Zoom, facilitated by a gamemaster and including human assessors using traditional assessment centre methodology. The process lasted two weeks and included developmental feedback for candidates. The tools are described in detail below (Table 1), offering insights for researchers, recruiters, and GRA developers.

The process began with a kick-off meeting during which participants were introduced to the assessments, informed of deadlines and technical requirements, and given the opportunity to ask questions. They selected a preferred date for the group task and received a registration link for the individual task.

Prior to the recruitment period, train-the-trainer session was held to prepare assessors, align expectations, and build a shared understanding of the targeted competencies. Assessors also participated in The Collectors to experience the challenges that candidates would later face.

## 2.2 Individual Task

The first assessment, ClusterMind, is a browser-based video game in which players are immersed in a futuristic science laboratory. They take on rotating roles (e.g., consultant, engineer), each with unique responsibilities. The gameplay is a mix of arcade and real-time strategy mechanics, requiring keyboard and mouse coordination. The core challenge involves managing customer flow and balancing individual tasks with helping team members.

The game was distributed following the kick-off meeting. Participants received individual registration links via email. After completing a demographic survey, they could access the browser-based game, which required no installation. The game began with a mandatory tutorial explaining the plot and mechanics. It could be played multiple times, depending on candidate's needs. The main game is automatically saved, but the participants were encouraged to complete it in a single session (approximately 90 minutes). Personalized feedback report was delivered immediately after completion.

ClusterMind assesses five soft skills grouped into two areas: accountability (self-reliance, initiative, decision-making) and teamwork (goal alignment, inviting collaboration, offering support). Skills are inferred from in-game behaviours and decisions.

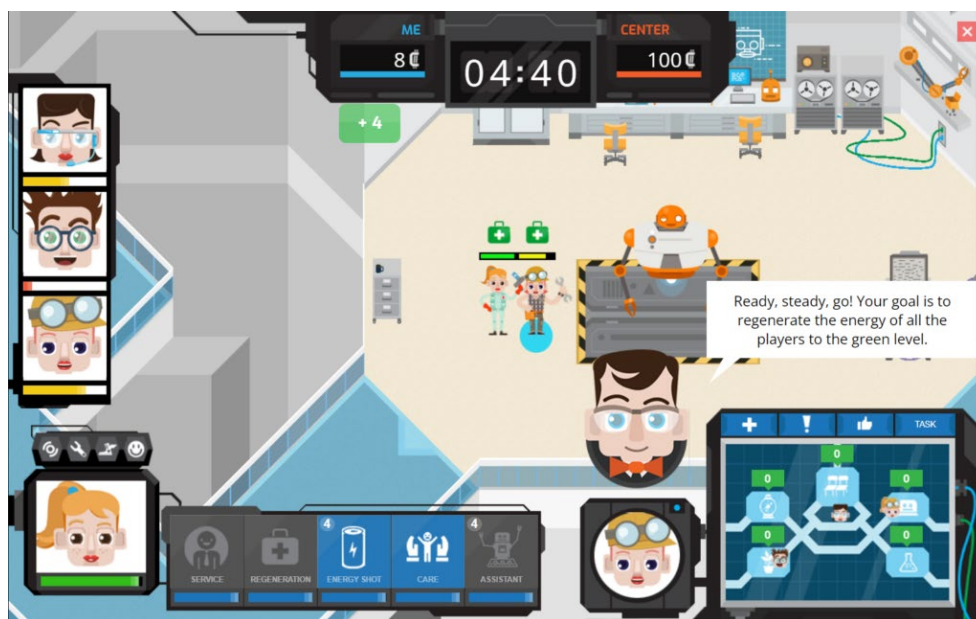


Figure 1: Screenshot from ClusterMind

## 2.3 Group Task

The Collectors, originally developed as a training game, served as the group assessment. Its storyline involves auctioning lost luggage at major international airports. Participants form teams to create and adjust strategies in response to evolving market rules. The game requires strategic collaboration, adaptability, and effective communication.

The game was conducted via Zoom and facilitated by a game master, who introduced the mechanics and the plot. Groups were created, each of approximately eight participants, and up to ten groups running concurrently. After an initial ice-breaker and a test round, participants engaged in three rounds of gameplay, each representing a different airport with a unique scoring system. Teams had 15 minutes to prepare a shared strategy before returning to the main room to bid individually in the auction. A leaderboard was shown after each round.

Trained assessors observed behaviours linked to communication, leadership, and problem-solving. These behaviours were discussed and evaluated on a 3-point scale after the game. Competency definitions and assessment criteria were provided to assessors beforehand.

## 2.4 Game-related Assessments Comparison

Although both tools are GRAs, they differ significantly. Most notably in the presence of human interaction. The table below summarises key features of each tool.

**Table 1: Characteristics of *ClusterMind* and *The Collectors* according to Bedwell et al.'s (2012) taxonomy**

Category	ClusterMind	The Collectors
<b>Action language</b>	Player controls a character using keyboard and mouse.	Players vote during auctions and discuss strategy with teammates.
<b>Assessment</b>	Data collected on decisions, actions, and in-game survey responses.	Human assessors evaluate observable behaviours using a structured document.
<b>Conflict / Challenge</b>	Serving customers across four areas, prioritisation, and working under time pressure.	Creating and adjusting group strategy in a dynamic environment.
<b>Control</b>	Players take on four different roles, each round controlling a different role. Actions are specific to each role and include manual and automated customer service, restoring energy, and generating customers.	Players use a website to select auction options. Their individual choices affect the scores of the whole team.
<b>Environment</b>	A futuristic research lab, where students, businesspeople and astronauts are served by a group of characters with complementary skillsets.	Each round takes place on a different airport. Players become teams of traders looking to maximize their profit during lost luggage auctions.
<b>Game fiction</b>	The game plot is abstract. Prior knowledge doesn't provide an advantage. The core challenge is workflow management, as several roles possess unique features and must cooperate.	The plot is similar to some TV shows, but this kind of work remains abstract for ordinary people. Prior knowledge doesn't help, as the auction rules are specific to the game.
<b>Human interaction</b>	Single-player mode. Other characters appear as potential playable roles but are controlled by AI.	Game is played in groups, during a ZOOM meeting. All the players are real people, other candidates. Participants cooperate with their teammates and compete with other teams.
<b>Rules / Goals</b>	The goal is to serve all the incoming customers while maximizing profit. The player is made aware of the rules through a tutorial and a test game before starting the main part.	The goal is to maximize the profit from all three auctions and outrun other teams. The players are made aware of the rules through a tutorial and a test game before starting the main part.

## 3. Results

### 3.1 Comparison with Traditional Assessment

Before gamification was introduced, traditional assessment methods were used for two years. In total, 434 candidates participated in these assessments. In 2020, 15 assessment sessions were held, and in 2021, 12 sessions took place. Each session lasted more than three hours and involved up to 10 assessors. The total number of assessors was 106 in 2020 and 90 in 2021. Three separate kick-off meetings were conducted prior to the sessions. Additionally, analytical and mathematical tests were administered, with an average completion time of approximately 30 minutes.

The use of GRAs enabled the process to scale. The number of candidates increased, reaching 319 in 2024. At the same time, the number of assessors required decreased to 32 in the first year of implementation and 27 in each of the following two years.

The time commitment required from each candidate was also reduced. In the game-related assessment scenario, candidates participated in a two-hour kick-off meeting, the individual task *ClusterMind* (two hours), and the group task *The Collectors* (two hours). Assessors attended a two-hour 'train-the-trainer' session and subsequently participated in the assessments.

## 3.2 Feedback

### 3.2.1 Quantitative feedback

Candidate reaction surveys were gathered after the assessment sessions, with 126 responses in 2022, 112 in 2023, and 212 in 2024. The summarized data was analysed. As the data was gathered on the same sample and regarded two different elements of the same process, Wilcoxon signed-rank test was used to check if there are differences in candidates ratings of both tools and their perceived difficulty.

Candidate reaction surveys were collected following the assessment sessions, with 126 responses in 2022, 112 in 2023, and 212 in 2024. The aggregated data were analysed. The Wilcoxon signed-rank test was used to examine whether differences existed in candidate ratings of the two tools and their perceived difficulty.

Participants rated The Collectors more favourable,  $M = 8.91$ ,  $SD = 1.46$ , than ClusterMind,  $M = 7.52$ ,  $SD = 2.23$ . The difference was statistically significant ( $Z = -5.69$ ;  $p < .001$ ). There was also a difference in perceived difficulty ( $Z = -3.47$ ;  $p < .001$ ), with The Collectors ( $M = 6.79$ ;  $SD = 1.73$ ) seen as a slightly more difficult than ClusterMind ( $M = 6.45$ ;  $SD = 2.1$ ).

These results suggest both tools were positively received, with The Collectors rated more favourably despite its slightly higher perceived difficulty.

### 3.2.2 Qualitative feedback

Open-ended questions were used to gather qualitative data. Participants were asked: "Please share your thoughts on the recruitment process," and "If you could change one thing about the Assessment Centre meeting, what would it be?"

Many respondents valued the game-based structure, noting that it helped them show teamwork, communication, and problem-solving skills. Some also reported gaining personal insights. For example, one candidate stated: "I think this online infrastructure is great, can be considered more playful and efficient ways of getting to know the talents." Others expressed gratitude for the individual feedback provided after completing ClusterMind: "I appreciate the fact that you gave us feedback after the individual task."

A few respondents expressed scepticism about the validity of game-related assessments: "The ClusterMind could be a bit biased towards people who regularly play video games."; "I think it depends on luck more than assessing abilities." The group task was mentioned more frequently, and typically in a positive context.

When asked about potential improvements to the assessment process, a significant number of participants (over a third) expressed strong satisfaction, often stating that they would not change anything. Descriptions such as "fun", "well-organised", and "refreshing" were commonly used. The structure and preparation were praised, and the use of games was perceived as a fresh and enjoyable change from traditional methods. Participants appreciated the opportunity to meet other candidates, and several suggested incorporating more social interaction, such as pre-meetings with teammates, longer debriefings after sessions, or the ability to exchange contact information: "I enjoyed it, met and exchanged contacts with great people."; "I had a lot of fun and I met amazing people."

Some areas for improvement emerged. A few respondents suggested that the groups should be smaller and more diverse in terms of nationality and gender. Others recommended allocating more time for group discussions in *The Collectors*. For some, *ClusterMind* was confusing or not perceived as a valid assessment method. There were also concerns about whether the games might favour extraverted individuals or those who respond quickly under pressure.

Overall, the sentiment was largely positive. Critiques were constructive and often accompanied by expressions of appreciation and gratitude.

## 4. Discussion

This study adds to the growing body of literature on GRAs in recruitment by examining two contrasting approaches implemented in a real-life, international selection process. The findings provide insights into how applicants perceive different types of GRAs, underscoring the importance of human interaction, the format of the assessment, and the broader context in which the tool is embedded.

One of the most important findings was that although both used games were well received by the candidates, they preferred *The Collectors*, an online assessment centre incorporating a playful, cooperative group task,

over ClusterMind, a fully automated, immersive game-based assessment. This was true even though *The Collectors* was slightly more challenging, as rated by participants. Qualitative feedback highlighted the value of meeting other candidates, collaborating on tasks, and being observed by assessors, all of which contributed to a more engaging and motivating experience. These results align with previous research suggesting that human involvement and social interaction improve applicants' perceptions of recruitment processes (Köchling et al., 2022; Gonzalez et al., 2021).

*The Collectors* represents a relatively rare example of a GRA that does not rely on a videogame or algorithmic evaluation, but rather uses a traditional assessment centre structure, conducted online, with a game as the central task. Combined with the automated assessment represented by ClusterMind, the hybrid approach appears to successfully combine the benefits of gamification (e.g., increased engagement, immersion) with the strengths of human-led assessment (e.g., richer social cues, perceived fairness, contextual judgement). The results suggest that candidates may respond more positively when they feel they are being evaluated in a social context, even when competing for the same positions. In this case, the presence of other participants seemed to shift attention away from the evaluative nature of the process, making the experience more enjoyable and less stressful.

The comparison between *The Collectors* and ClusterMind illustrates a broader need to differentiate between types of GRAs. Presented study supports the view that GRA is not a single, homogenous category, but a spectrum ranging from soft-gamified questionnaires to fully immersive game-based assessments (Ramos-Villagrasa & Fernández-del-Río, 2023). Although it's not clear which type *The Collectors* would be classified to, but due to the traditional method of assessment it seem to lie within soft-gamification category. Each type of GRA may serve different organisational purposes and evoke different candidate experiences. Practitioners should therefore be equipped with clear, evidence-based guidelines to help select the appropriate type of GRA depending on the recruitment goal, whether that is improving engagement, increasing standardisation, reducing costs, or identifying specific skills.

While automated assessments offer scalability, efficiency, and standardisation, they may compromise candidates' satisfaction with the process in comparison with assessments involving social interaction. This echoes previous research on interviews, showing that AI-driven or algorithmic processes can lead to lowered applicant reactions, especially when perceived as overly mechanistic or impersonal (Bedemariam & Wessel, 2023; Cui et al., 2025). That being said, it is important to highlight that in the presented research both assessment tools were rated favourably.

The strength of this study lies in its ecological validity. The data were collected from a real selection process involving a large sample of international candidates over three consecutive years. Moreover, the novelty of *The Collectors* as an online, assessor-led group task adds a valuable contribution to the literature on gamified assessments, which so far has focused on tools in the form of applications.

However, the study also has limitations. First, the two games assessed different competencies, which limits the extent to which they can be directly compared in terms of predictive validity. Second, while both quantitative and qualitative feedback was gathered, the amount of structured data was limited, and reactions were not mapped onto established theoretical models such as applicant reactions model (Hausknecht et al., 2004; Bauer et al., 2001; Ryan & Ployhart, 2000) or technology acceptance model (Marangunić & Granić, 2015). Third, the candidate pool consisted primarily of young students, many of whom were in the food and agriculture sector, which may restrict the generalisability of the findings. Finally, while a previously used traditional assessment centre is referenced, limited data about it were available, and the comparison was therefore restricted to logistical and experiential aspects.

Other potential confounding factors should also be considered, such as individual personality traits. In assessment centres, assessors often record not only behavioural observations but also trait-based impressions (Lievens et al., 2001). However, findings regarding which traits are favoured remain mixed. Furnham et al. (2008) found that only openness correlated with assessment outcomes, while Spector et al. (2000) identified correlations between extraversion, openness, emotional stability, and performance in interpersonal tasks. The present study focused on the practical implementation of a mixed-method game-related assessment, and did not include personality measures. It is plausible that the methods employed produced similar levels of trait-related bias as traditional assessment centres, or potentially lower, due to the immersive and enjoyable nature of the assessment tasks.

Another concern relates to demographic variables, particularly differences in age and gaming experience. Traditional assessment methods, such as questionnaires and structured interviews, are more familiar to a wide range of candidates, particularly older or more experienced ones. By contrast, game-related assessments may disadvantage individuals with limited gaming experience. In the current study, the participants were students and recent graduates, and thus relatively homogeneous in age and digital literacy. While ClusterMind, a single-player video game, might favour candidates with prior gaming experience, this was mitigated by an interactive tutorial. The Collectors relied on verbal collaboration and was unlikely to be influenced by gaming experience. As such, the assessment process described here is likely to be less biased against non-gamers than a purely digital GBA, though possibly more so than a conventional assessment centre. Future research should examine how gaming experience and age influence performance and perceptions across various GRA formats.

This research demonstrates that candidate experience in GRA is shaped not only by the content and difficulty of the assessment, but by its format, social dynamics, and degree of human interaction. These results suggest that the social component of assessment centres, even in online formats, may significantly enhance engagement and distract from performance pressure. It allows the candidates to enjoy the process. While automated GRAs offer benefits in terms of scalability and cost-efficiency, our findings indicate that human-led, socially embedded tools may be slightly more favourably received. This effect was observed regardless of the multiplayer task being rated as more difficult. The practical implications are suggested for both assessment designers and employers seeking to optimise candidate experience in the context of fair, effective, and engaging recruitment. The presented results help practitioners to navigate in GRA tools and to choose the best suited tool depending on the needs.

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**AI Declaration:** AI tools were not used in the creation of the paper.

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