

Bridging education and industry: university challenges and serious games for professional skill development

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Abstract

Purpose – The purpose of this research is to explore how experiential learning activities enhance soft skills, reduce skill-role misalignments and contribute to students' professional preparedness in operations and supply chain management. This study explores how experiential learning activities, particularly serious games and university challenges, contribute to students' skill development and professional alignment. The objective is to provide empirical insights on how these methodologies can bridge the gap between academic learning and industry demands in operations and supply chain management.

Design/methodology/approach – This study examines the impact of experiential learning activities – namely university challenges and serious games – on students' soft skills development and their alignment with professional roles. A structured methodology, combining survey questionnaires and correlation analyses, was employed to evaluate participants' psycho-attitudinal traits, soft skills and role coherence. The data were analyzed using reliability tests (Cronbach's alpha) and Pearson's correlation matrices.

Findings – The findings demonstrate that participants in experiential learning activities exhibit fewer misalignments with professional role profiles compared to non-participants. Significant correlations were found between participation and improvements in soft skills, such as leadership, teamwork and adaptability, alongside greater self-awareness in self-assessment.

Research limitations/implications – The study's limitations include a relatively small sample size and the focus on a single university course. Expanding the study to include larger and more diverse samples across different academic disciplines would enhance generalizability.

Practical implications – The study highlights the potential for integrating serious games and university challenges into academic curricula to address skill gaps and better prepare students for industry roles. Companies can leverage these tools for early talent identification, enhancing recruitment strategies and fostering partnerships with academic institutions.

Originality/value – This study offers empirical evidence on the role of experiential learning in bridging the gap between theoretical education and professional demands. By focusing on the development of soft skills and role alignment, the research provides actionable insights for both educational institutions and employers in operations and supply chain management.

Keywords Experiential learning, Soft skills development, University challenges, Serious games, Operations and supply chain management, Role alignment

Paper type Research article

1. Introduction

Higher Education Institutions (HEIs) are complex service organizations, this research aligns with the scope of this special issue by addressing the role of experiential learning methodologies in equipping students with industry-relevant skills. By integrating gamification and university challenges, this study contributes to the ongoing discourse on bridging education and industry needs, particularly in the context of operations and supply chain management where the quality of educational services is shaped by interactions among



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multiple stakeholders, including students, faculty, administrative personnel, and the broader community (Li *et al.*, 2019). HEIs face emerging challenges driven by technological innovation, evolving labor market demands, and the need for continuous quality improvement (Gonzalez Aleu *et al.*, 2021). As a response, innovative pedagogical approaches, such as gamification and university challenges, are being adopted to enhance the quality of education, develop critical competencies, and prepare students for the demands of an increasingly dynamic professional environment (Colombelli *et al.*, 2022). Gamification, defined as the use of game design elements in non-game contexts (Deterding, 2019), has proven to foster engagement, facilitate learning, and bridge the gap between theoretical knowledge and practical application (Ryan and Deci, 2020). Within this framework, Serious Games (SGs) and university challenges stand out as effective tools to enhance learning outcomes and professional skill development. SGs, unlike traditional gamified methods, prioritize educational objectives over entertainment by immersing students in structured and realistic scenarios (Taş and Bolat, 2023; Kapp, 2012). Meanwhile, university challenges, such as the Formula Student competition and the Google Online Marketing Challenge, offer students the opportunity to tackle real-world problems, applying theoretical knowledge to practical contexts while developing teamwork, problem-solving, and project management skills (Bischoffgrethe *et al.*, 2009).

To address these issues, this study investigates the role of Serious Games and university challenges as tools to improve the perceived quality of education, enhance student skill development, and foster readiness for professional roles. Specifically, the research poses the following questions:

- RQ1. To what extent do Serious Games and university challenges improve student learning and skill acquisition?
- RQ2. Can participation in these gamified activities positively influence students' professional preparedness and job role alignment?

The remainder of this paper is structured as follows. The next section provides a comprehensive literature review on gamification, Serious Games, and experiential teaching methods, highlighting key contributions and existing research gaps. Section 3 outlines the methodology adopted in this study, with a particular focus on the implementation of Serious Games and university challenges within a Management Engineering course at Tor Vergata University in Italy. Section 4 presents the results, including analyses derived from surveys and personality tests administered to the students. Finally, Section 5 discusses the key findings, their implications for education quality improvement, and directions for future research.

2. Literature review

2.1 Gamification in education

The concept of Gamification—defined as the integration of game design features into non-game contexts—has become a significant area of research and application in education (Deterding, 2019). These innovative methods align with the needs of modern organizations, which increasingly seek professionals equipped with both technical expertise and soft skills, such as critical thinking, adaptability, and effective communication (Abbas, 2020). By fostering experiential learning, gamification and university challenges can improve students' perceived quality of education while enhancing their employability. However, the success of these approaches depends on a pedagogically informed design and implementation. Superficial gamification practices—focused solely on transactional mechanisms like points, badges, and rewards—risk undermining engagement and limiting educational impact (Robertson, 2010; Zichermann, 2013). In contrast, well-structured interventions that emphasize intrinsic motivation and self-determined learning have been shown to yield superior outcomes (Ryan and Deci, 2020). Initially conceived in economic and commercial

sectors to influence consumer behaviors and foster engagement, gamification has expanded into education as a tool to enhance motivation, learning, and behavioral change (Jaccard *et al.*, 2022; Burke *et al.*, 2016). Its success lies in its ability to leverage both intrinsic and extrinsic motivation, fostering a dynamic and engaging learning environment that encourages students to remain actively involved in the educational process (Vogel and Schwabe, 2016). However, its implementation is not without challenges: gamification is a context-dependent methodology that requires careful planning, customization, and alignment with learners' needs (Burke *et al.*, 2016; Rodríguez-Rodríguez *et al.*, 2020). Inappropriate or poorly designed implementations risk reducing gamification to a collection of mechanical tools—points, badges, and leaderboards—that fail to achieve meaningful educational outcomes (Kapp, 2012).

2.2 University challenges and experiential learning

Transitioning from SGs to more structured team-based approaches, university challenges and hackathons represent innovative pedagogical methods that combine experiential learning with real-world problem-solving. These challenges, often developed in partnership with national or international organizations, immerse students in real-life scenarios that mirror industry demands. Within the context of operations and supply chain management, university challenges require students to analyze processes, optimize resources, and propose innovative solutions, enabling them to bridge the gap between academic learning and professional readiness (Johnson *et al.*, 2023; Membrillo-Hernández *et al.*, 2019). Not only do these challenges allow for the acquisition of technical and analytical skills, but they also foster attitudinal development, including creativity, resilience, and a results-oriented mindset (Salinas-Navarro *et al.*, 2024). The COVID-19 pandemic has acted as a major disruptor in the field of education, prompting a rapid shift toward remote and hybrid learning environments and challenging traditional pedagogical models. These changes have emphasized the need for more flexible, engaging, and student-centered approaches capable of maintaining motivation and learning continuity despite physical distance. In this context, gamification has emerged as a valuable pedagogical strategy that aligns with the post-pandemic educational landscape. By leveraging game-based dynamics such as feedback, progression, and reward systems, gamification fosters active participation, enhances learner autonomy, and supports the development of key digital and transversal skills. These features make it particularly suited to addressing the emerging needs of both educators and students in the aftermath of disruptive events, thereby contributing not only to improved learning outcomes but also to the broader goal of educational resilience and innovation (Salinas-Navarro *et al.*, 2024). For instance, studies have shown that participating in these challenges significantly improves students' entrepreneurial mindset, problem-solving abilities, and critical thinking skills, which are all highly valued in professional environments (Colombelli *et al.*, 2022; Díaz-Ramírez, 2020). In addition, these methods promote collaborative skills by requiring participants to work in multidisciplinary teams, simulating the teamwork dynamics encountered in real-world operations. This focus on collaborative learning aligns well with the soft skills increasingly sought after by industries in rapidly evolving sectors (Fantozzi *et al.*, 2022; Huang-Saad *et al.*, 2019).

2.3 Serious games and professional development

To address some of the shortcomings of gamification, Serious Games (SGs) have emerged as a more structured and comprehensive approach to game-based learning. Unlike basic gamification, SGs involve the creation of fully immersive, game-like environments designed explicitly for educational purposes. Rather than simply layering game elements over existing systems, SGs establish new, scenario-based contexts that prioritize realistic, goal-driven learning experiences (Louw and Deacon, 2020; Kapp, 2012). This methodological difference enables SGs to facilitate the development of psycho-attitudinal skills, such as

critical thinking, problem-solving, adaptability, and self-efficacy—skills that are essential for success in both academic and professional settings (Altomari *et al.*, 2023; Huang-Saad *et al.*, 2019). Notably, these games have been shown to promote collaborative learning and engagement, creating a bridge between theoretical knowledge and practical applications (Fantozzi *et al.*, 2024; Madero-Gonzalez *et al.*, 2025). Within Engineering Education, and particularly in operations and supply chain management, gamification and serious games have proven effective in addressing specific learning goals. These fields are inherently practical and require a combination of technical competencies, strategic decision-making, and soft skills such as teamwork, leadership, and adaptability (Pekkanen *et al.*, 2020). For example, simulations and serious games have been successfully implemented in project management and supply chain courses to improve students' understanding of complex systems and enhance their ability to make strategic decisions under realistic constraints (Ameerbakhsh *et al.*, 2019; Jaccard *et al.*, 2022). By placing learners in scenario-based challenges, these methods encourage deliberate practice, fostering problem-solving skills and developing students' psycho-attitudinal characteristics that align with professional roles (Lau, 2015). Despite the growing body of literature highlighting the benefits of gamification, SGs, and university challenges, several limitations persist. One notable challenge is the lack of pedagogical training among instructors, which can hinder the design and facilitation of effective game-based learning environments (Huang-Saad *et al.*, 2019). Instructors often rely on qualitative assessments such as self-reported surveys or case studies, which, while valuable, may lack the rigor and generalizability required to draw conclusive evidence about the long-term impact of these methods (Fantozzi *et al.*, 2023). Additionally, research focusing on the psycho-attitudinal development of students remains limited, particularly in terms of evaluating their role alignment and professional readiness. For instance, few studies systematically analyze the extent to which university challenges and SGs prepare students for specific industry roles or assess their impact on long-term job satisfaction.

In this context, this study aims to address these gaps by exploring the role of serious games and university challenges in fostering psycho-attitudinal development and enhancing students' fit-to-role in the domain of operations and supply chain management.

In conclusion, the integration of gamification, serious games, and university challenges into higher education offers considerable potential to improve learning outcomes, psycho-attitudinal skills, and role-specific readiness. These methods provide a dynamic, experiential learning environment that fosters both technical competencies and the attitudinal attributes required for success in modern professional settings. By addressing these gaps, this study contributes to a deeper understanding of how innovative pedagogical approaches can align education with industry demands, particularly in fields like operations and supply chain management.

3. Methodology: design of experiential activities and assessment tools

3.1 University challenges and serious game

To evaluate the outcomes of this study, both Serious Games and university challenges were analyzed for their impact on students' psycho-attitudinal development and their alignment with professional roles, particularly in the domain of operations and supply chain management. The methodological approach combines two experiential learning tools: university challenges, based on real-world business cases, and a Serious Game called "How It Is Game" (HIIG), developed within an Industrial System Engineering course. Together, these tools provided a structured framework for assessing students' technical competencies, teamwork, and attitudinal attributes.

The university challenges examined in this study were designed in collaboration with prominent companies, including Amazon, Ferrero, and Calzedonia. This study was conducted within the Industrial Systems Engineering course at Tor Vergata University of Rome, a public institution known for its strong emphasis on applied engineering education and industry

collaboration. This challenge was specifically proposed within master's degree courses to enhance advanced skill development and professional readiness. These challenges provided students with a direct engagement in real-world problems, fostering a practical understanding of operations and supply chain management. While minor variations occurred between different editions, the overall structure remained consistent, unfolding through five key phases. Each challenge began with company representatives presenting one or more operational problems that reflected real business needs. These problems were carefully designed to ensure practical relevance and were accompanied by a clear definition of rules, evaluation criteria, and submission deadlines, offering students a structured framework for participation. Once the problems were introduced, student teams collaborated to develop solutions, emphasizing critical thinking, teamwork, and innovative problem-solving. Throughout this process, participants had the opportunity to interact with company representatives or course instructors to gather additional insights and refine their proposals. The evaluation phase followed, where submitted solutions were assessed based on well-defined criteria, including effectiveness in addressing the problem, cost-efficiency, and originality of approach. A shortlist of finalists was then identified, and these teams were given the chance to visit company facilities related to the challenge. This experience allowed them to gain a deeper understanding of operational processes and constraints. In some cases, company HR teams conducted interviews with the finalists to assess their suitability for potential internships or employment opportunities.

The challenge concluded with the selection and announcement of the winning team, which was rewarded with valuable opportunities such as internships, additional company visits, or official recognition for their achievements.

These challenges tested students' technical knowledge and ability to work under pressure while fostering resilience, creativity, and collaborative problem-solving skills—key attributes for professionals in operations and supply chain management.

The Serious Game analyzed in this study, titled "How It Is Game" (HIIG), was developed within the Industrial System Engineering course at the University of Rome Tor Vergata, part of the Engineering and Management Bachelor program. HIIG aligns with established definitions of serious games in the literature, integrating game elements—such as goals, rules, increasing difficulty, competition, cooperation, and feedback—into a realistic and structured game environment (Bertozzi *et al.*, 2024). These elements combine instructional content with gameplay mechanics, fostering cognitive and attitudinal development in a safe yet challenging setting (Landers, 2023; Urگو and Arguello, 2022).

The HIIG methodology was structured into six phases, aiming to enhance both individual and collaborative competencies through a progressive learning approach. It began with an initial competency test, where students assessed their baseline knowledge of process analysis and industrial systems, serving as a reference for future evaluations. Following this, each student individually analyzed a video illustrating a production process, constructing a process chart to identify key steps, decision points, and system flows. This phase emphasized analytical skills and attention to detail. Once completed, students were randomly grouped into teams to discuss and integrate their individual analyses. Through collaborative review and validation, they refined their descriptions and diagrams, fostering teamwork, communication, and consensus-building. A mid-course test was conducted to evaluate students' progress in understanding and applying process analysis to operational contexts. Subsequently, teams were paired to compare and assess production processes using an evaluation schema provided by instructors. This comparative phase introduced a competitive element, encouraging critical assessment and decision-making refinement. The final phase involved a self-assessment and structured feedback session, where students reflected on their learning experience, identified personal growth areas, and linked their skills to professional expectations in operations and supply chain roles. By combining real-world business cases with immersive, game-based simulations, the HIIG methodology and university challenges facilitated the development of essential competencies. Students strengthened their process analysis skills, improved

teamwork and communication, built resilience and adaptability, and aligned their abilities with professional requirements. The structured assessment approach ensured a continuous evaluation of learning outcomes, effectively bridging the gap between theoretical knowledge and real-world applications.

To comprehensively assess the impact of these experiential learning activities—university challenges and the HIIG Serious Game—on students’ psycho-attitudinal development and professional role alignment, a customized questionnaire was developed. This tool was designed to measure key indicators related to soft skills, personality traits, and the alignment of students’ competencies with their desired professional roles.

The questionnaire focused on evaluating the following dimensions:

- (1) *Soft skills development*: Indicators such as teamwork, problem-solving, critical thinking, leadership, communication, and adaptability were assessed to understand the extent to which these activities fostered essential competencies required in professional settings.
- (2) *Personality traits*: Specific psycho-attitudinal attributes, including resilience, self-efficacy, and openness to new challenges, were measured to capture the behavioral and attitudinal changes induced by the experiential learning tools.
- (3) *Professional role alignment*: Participants were asked to evaluate their perceived alignment with the roles they aspire to within operations and supply chain management, including their confidence in applying the acquired skills and knowledge in real-world contexts.

By combining the results of this quantitative assessment with the structured design of the university challenges and the Serious Game, this study provided a systematic evaluation of how such activities contribute to bridging the gap between academic learning and professional readiness. The use of targeted indicators ensured a nuanced understanding of students’ personal and professional growth, emphasizing the relevance and applicability of experiential methodologies in higher education curricula. This holistic approach not only measured the learning outcomes achieved but also validated the effectiveness of these tools in preparing students for future professional roles, offering insights for educators and industry partners on the value of integrating gamification and real-world challenges into university programs.

3.2 Design and structure of the psycho-attitudinal test

To evaluate the psycho-attitudinal development of students and their alignment with professional roles, a comprehensive questionnaire was designed. The instrument comprises several sections, each serving a specific purpose, ensuring a structured and robust evaluation. The main components of the questionnaire include:

- (1) Descriptive section of the sample

The descriptive section aims to analyze the demographic and professional characteristics of the sample under examination. It includes 10 questions covering key variables such as gender, age, education level, professional experience, and area of employment. This section provides a comprehensive overview of the participants, allowing for a more contextualized analysis of the results; moreover, serves as the foundation for subsequent analyses, providing critical context for interpreting psycho-attitudinal and soft skill evaluations.

- (2) Psycho-attitudinal section

The psycho-attitudinal section measures two dimensions of the maturity framework: attitudes and personality traits. The assessment is based on 16 packages aligned with the work styles defined in the O*NET database. Each package evaluates a specific aspect of work behavior, including achievement, adaptability, leadership, and stress tolerance.

For each package, psychological dimensions were selected from the IPIP database (International Personality Item Pool), which is widely recognized for its robustness and scientific validity. A total of 49 dimensions were measured using a 5-point Likert scale, where participants responded to 196 items:

- (1) Strongly disagree
- (2) Partially disagree
- (3) Neither agree nor disagree
- (4) Partially agree
- (5) Strongly agree

Each dimension includes a balance of positive and negative items to reduce response bias and ensure accuracy. The results of this section provide insights into participants' work styles, strengths, and areas for improvement, offering a nuanced understanding of their psycho-attitudinal maturity.

- (6) Soft skills section

The soft skills section evaluates key behavioral and interpersonal competencies critical for professional success. These skills were selected based on their relevance to the operations and supply chain management domain. Participants responded to items designed to assess their ability to adapt, communicate effectively, and solve complex problems. The evaluation of these soft skills is essential to measure participants' readiness for real-world professional roles.

- (7) Lie scale section

To ensure the validity of the questionnaire, a Lie Scale section was included. This component consists of duplicated questions rephrased differently and randomly distributed throughout the questionnaire. Its purpose is to detect inconsistencies in responses, identify careless participants, and improve data reliability. Similar approaches have been successfully adopted in tools such as the SKILLS-in-ONE questionnaire ([Escola-Gascón and Gallifa, 2022](#)).

The structured design of this questionnaire ensures a rigorous and multi-dimensional assessment of participants' psycho-attitudinal traits, soft skills, and their perceived suitability for professional roles. By combining the descriptive section with detailed evaluations of attitudinal dimensions and behavioral competencies, the tool provides a robust framework to measure the key indicators necessary for understanding students' development and alignment with professional expectations. This section plays a crucial role in capturing both quantitative and qualitative insights related to participants' strengths, areas for improvement, and attitudinal maturity. The integration of a Lie Scale further strengthens the reliability and validity of the collected responses, ensuring that the results reflect consistent and accurate self-assessments. In the next section, the results of the analyses conducted on the collected samples will be presented. These findings will provide a detailed overview of how the experiential learning activities—Serious Games and university challenges—have influenced the measured dimensions, offering key insights into the impact of these tools on student development and role alignment.

4. Results and analysis of the questionnaire data and correlations

In this section, we analyze the results obtained from the administration of the questionnaire and identify significant correlations between participants who engaged in the experiential learning activities described in the previous section and those who did not. The attitudinal and soft skills questionnaire was administered online using Google Forms, with the entire instrument digitized and distributed via links sent to participants. This approach was chosen for both

practical and theoretical reasons. From a practical perspective, online administration ensured rapid and efficient data collection while allowing responses to be formatted for immediate analysis, eliminating the need for manual entry or data transcription. Additionally, conducting the questionnaire verbally or in person would have significantly restricted the sample size due to the length of the test and the time required for completion. From a theoretical standpoint, the online method facilitated a broader and more flexible sample selection without necessitating predefined participant clusters.

Participants provided their responses using a 5-point Likert scale for all items. Before conducting statistical analyses, negatively keyed responses were converted into positive keying to ensure consistency. The reliability of the questionnaire was assessed using Cronbach's alpha, a widely recognized measure of internal consistency. Given the two main sections of the questionnaire—psychometric and soft skills—Cronbach's alpha was calculated separately for each section as well as for the overall instrument. The results of the reliability analysis confirmed strong internal consistency, with a Cronbach's alpha of 0.810 for the psychometric section, 0.859 for the soft skills section, and 0.897 for the overall instrument. All indices exceeded the desirable threshold of 0.8, demonstrating a high level of consistency among the items and validating the effectiveness of the instrument in measuring the intended constructs.

To provide a general overview of the analyzed population and the companies involved, we conducted a descriptive analysis of the following dimensions:

- (1) Sociodemographic Characteristics: Gender, age, education, and work experience.
- (2) Company Characteristics: Industry sector and area of operation.

A total of 108 respondents participated in the questionnaire. The findings are summarized below:

- (1) Gender distribution:
 - (1) Male: 57%
 - (2) Female: 43%
 - (3) No participant chose to withhold their gender identity.
- (2) Age distribution:
 - (1) Under 25 years: 35 participants
 - (2) Between 25 and 30 years: 43 participants
 - (3) Between 36 and 40 years: 30 participants
- (3) Education level:
 - (1) All respondents hold at least a Master's degree, ensuring a homogeneous educational background.
- (4) Professional experience:
 - (1) No prior experience: 34%
 - (2) Junior (1–3 years of experience): 37%
 - (3) Senior participants (5–10 years): 29%
- (5) Industrial sectors:

The respondents' companies operate in a diversified range of industries, with equal representation (25% each) in the following sectors:

- (1) Energy and Renewable
- (2) Manufacturing
- (3) Pharmaceutical
- (4) Technology
- (5) Food and beverage
- (6) Areas of expertise:

Participants’ areas of expertise were distributed across key domains relevant to operations and supply chain management:

- (1) Processes, Supply Chain, Logistics, and Materials: 58% combined representation.
- (2) Operations: The largest portion, accounting for 42% of the total sample.

Among the respondents, 38% did not participate in the experiential activities (Serious Games and University Challenges), while the remaining 62% actively took part in these initiatives.

To exemplify the observed trends, we highlight a notable finding: participants who engaged in the described activities demonstrated a greater alignment between their current roles and the standard role profiles outlined in the O*NET database. This database, widely recognized for its comprehensive framework, assigns specific scores to the characteristics and competencies required to successfully perform a given role.

In particular, analysis of the questionnaire results shows the following:

- (1) Participants in the experiential activities recorded an average of 2.2 misalignments with the O*NET-defined standard role profiles.
- (2) Non-participants, on the other hand, exhibited a significantly higher average of 3.6 misalignments.

Additionally, participants who took part in the activities displayed lower scores on the Lie Scale, suggesting a more consistent and reliable self-assessment compared to their non-participating counterparts.

The following [Figures 1 and 2](#) provide a visual representation of these findings, offering a clear comparison between the two groups and illustrating the impact of Serious Games and University Challenges on role alignment and competency development.

Now, let’s analyze the strengths and weaknesses of respondent R1. The summary [Tables 1 and 2](#) below provide a concise overview of these elements.

As evident from the strengths listed above, there are no soft skills present, indicating that R1 will need to work significantly on aligning their soft skills with those required for the role of “Logistic Engineers,” or consider changing roles. With the exception of the “Concern for

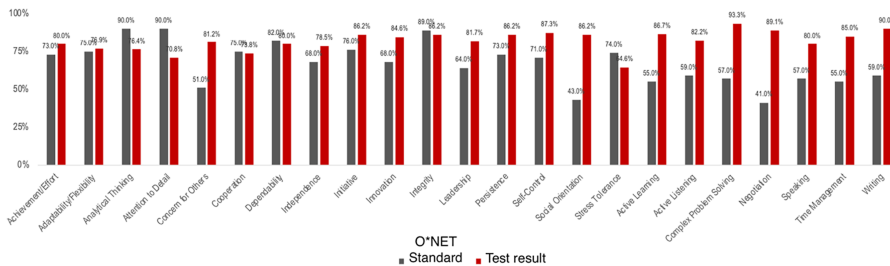


Figure 1. Role alignment results for non-participants. Figure by authors

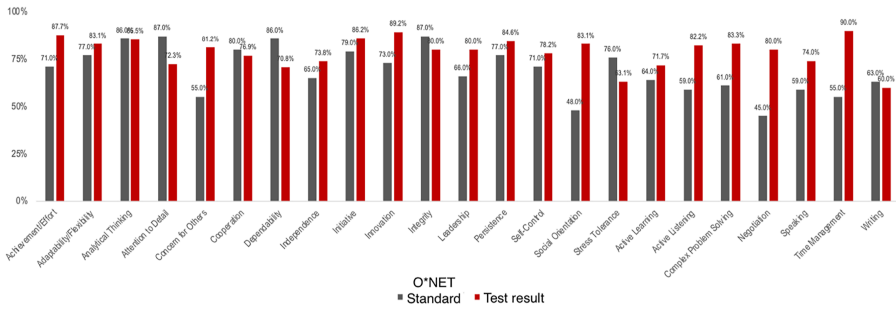


Figure 2. Role alignment results for participants. Figure by authors

Table 1. R1 strenghts

Package	SQ-error
Achievement/Effort	0.005
Adaptability/Flexibility	0.000
Analytical Thinking	0.019
Cooperation	0.000
Dependability	0.000
Independence	0.011
Initiative	0.010
Integrity	0.001
Persistence	0.017
Stress tolerance	0.009

Source(s): Table by authors

Table 2. R1 weaknesses

Package	SQ-error
Concern for others	0.091
Social orientation	0.186
Active learning	0.100
Complex problem solving	0.132
Negotiation	0.231
Time management	0.090
Writing	0.096

Source(s): Table by authors

Others” and “Social Orientation” packages, all other items included in the list of weaknesses pertain to the soft skills domain.

From the results analyzed above, it can be concluded that their soft skills are significantly misaligned when compared to the standard levels expected for the “Logistic Engineers” professional role. Moreover, analyzing the Lie Scale it results the total deviation between the original and repeated questions amounted to 19. Therefore, it can be concluded that the respondent did not answer entirely consistently.

Below, in Figure 2 the comparison between Respondent 2 (R2) and the standard profile for the role of Manufacturing Engineer is presented.

As evident from the strengths listed below, in Table 3 R2 will not need to adjust their soft skills to fulfill the role of Manufacturing Engineer. Notably, compared to R1, R2 has only two soft skills among the weaknesses, see Table 4, that require alignment with the standard. All other soft skills not mentioned in the above tables fall within the acceptable range. Therefore, it can be concluded that Respondent 2 is aligned with the standard expected for their professional role. The total discrepancy between the regular and repeated questions amounts to 14. Thus, it can be asserted that the respondent answered somewhat consistently. Out of the 20 responses, 11 had a discrepancy of 0, with a maximum discrepancy of 4.

To further investigate the impact of participation in experiential learning activities, a correlation analysis was conducted for both groups—non-participants and participants—with a specific focus on soft skills and related dimensions. The results of the Pearson correlation matrices are presented below in Tables 5 and 6.

Table 3. R2 strengths

Package	SQ-error
Adaptability/Flexibility	0.004
Analytical Thinking	0.000
Cooperation	0.001
Independence	0.008
Initiative	0.005
Integrity	0.005
Leadership	0.020
Persistence	0.006
Self-control	0.005
Stress tolerance	0.017
Active learning	0.006
Writing	0.001

Source(s): Table by authors

Table 4. R2 weaknesses

Package	SQ-error
Negotiation	0.123
Time management	0.123
Social orientation	0.123

Source(s): Table by authors

Table 5. Pearson's correlation matrix for non participating students

	Path satisfaction	Value added challenge	Soft skills development	Hard skills development
Value added	-0.278			
Soft skills development	0.247	0.455*		
Hard skills development	0.656**	-0.091	0.074	
Regret evaluation	-0.429	0.786**	0.296*	-0.024

Source(s): Table by authors

Table 6. Pearson's correlation matrix for participating students

	Path satisfaction	Added value in assessment phase	Value added in recruitment	Soft skills development
Added value in the assessment phase	0.576**			
Value added in recruitment	0.592**	0.584**		
Soft Skills development	0.631**	0.596**	0.455**	
Hard Skills development	0.433**	0.389**	0.386**	0.398**

Source(s): Table by authors

The correlation analysis reveals key differences between the two groups:

- (1) Participants show stronger and more significant correlations across soft skills development, path satisfaction, and value added, emphasizing the effectiveness of experiential activities in fostering critical competencies and increasing perceived value.
- (2) In contrast, for non-participants, the results indicate weaker relationships, with a higher focus on regret evaluation and less alignment between skills and value dimensions.

These findings underscore the role of experiential learning in closing competency gaps, enhancing students' readiness for professional roles, and increasing satisfaction with their career development path. In the following section, we will further elaborate on these findings and discuss their implications for educational strategies and professional alignment.

5. Discussions

The findings presented in this section provide significant insights into the impact of experiential learning activities, Serious Games, and University Challenges on the development of soft skills and alignment with professional roles. By analyzing participants and non-participants, notable trends emerged that highlight the importance of integrating practical, experience-based learning tools into higher education programs. From a social perspective, these findings demonstrate how experiential learning fosters not only professional readiness but also the development of key interpersonal and collaborative skills that are crucial for students' integration into society. By engaging in these activities, students enhance their ability to work in diverse teams, adapt to dynamic work environments, and communicate effectively—factors that contribute to greater employability and social inclusion. Universities adopting such methodologies can play a crucial role in reducing skill gaps and ensuring a smoother transition from academia to industry. Furthermore, given the increasing demand for professionals with strong soft skills, educational institutions can leverage these approaches to create a more inclusive and competency-driven learning environment. From a managerial perspective, the results emphasize that organizations can benefit from recruiting students who have engaged in experiential learning activities, as they exhibit stronger alignment with professional role expectations. Companies can leverage these findings to refine their recruitment strategies, targeting students who have demonstrated resilience, adaptability, and problem-solving capabilities through gamified and challenge-based learning experiences. This also suggests a potential for industry-academia collaborations, where businesses can actively participate in structuring these challenges to align them more closely with real-world job requirements. A critical aspect of this study is its applicability in teaching methodologies. The results provide strong evidence that integrating Serious Games and University Challenges into university curricula can significantly enhance the learning experience. Educators can use this framework to design more engaging and effective pedagogical approaches, ensuring that

students develop both technical and soft skills in a structured and measurable way. The ability to simulate real-world challenges within an academic setting offers students a risk-free environment to develop critical competencies before entering the job market. This study supports the notion that experiential learning should not be seen as an alternative, but rather as an integral component of modern education that complements traditional instruction. Moreover, it offers a scalable model that can be adapted across different disciplines to improve learning outcomes.

Moreover, this study serves as a starting point for further investigation into the relationship between experiential activities and students' psycho-attitudinal development. While the results indicate a positive impact, future research should explore deeper psychological factors, such as long-term behavioral changes, motivation, and self-efficacy. By expanding the scope of analysis, researchers can provide even more granular insights into how these learning experiences shape students' professional trajectories and personal growth. This opens up the possibility of longitudinal studies to track students' career progress and assess whether early exposure to experiential learning continues to influence their professional development over time. Regarding the research questions (RQ1 and RQ2), the study provides clear answers:

RQ1 (To what extent do Serious Games and University Challenges improve student learning and skill acquisition?): The findings highlight that participation in these activities leads to measurable improvements in soft skills such as leadership, teamwork, adaptability, and problem-solving. The structured design of these interventions allows students to actively engage in skill development rather than passively absorb theoretical concepts, reinforcing their professional preparedness.

RQ2 (Can participation in these gamified activities positively influence students' professional preparedness and job role alignment?): The results indicate a stronger alignment with standard industry role expectations among participants, reinforcing the value of experiential learning as a tool for professional development. The correlation between participation and reduced misalignment with professional roles highlights the tangible benefits of integrating these approaches into higher education, ensuring that students graduate with competencies directly applicable to industry demands.

This study not only provides immediate insights into the effectiveness of these methodologies but also opens avenues for future research aimed at deepening our understanding of the interplay between education, skill development, and professional success.

6. Conclusions

This study highlights the pivotal role of experiential learning activities, such as Serious Games and University Challenges, in developing psycho-attitudinal skills, fostering soft skills acquisition, and preparing students for professional roles. These findings have significant implications for both education and industry, providing a transformative approach to bridging academic training with real-world professional demands. By immersing students in realistic problem-solving scenarios and team-based challenges, these activities create an interactive learning environment that enhances collaboration, adaptability, leadership, and innovation. Unlike traditional teaching methods, which often lack direct applications, experiential learning allows students to refine their decision-making and critical thinking skills through hands-on engagement. This approach not only enriches the educational experience but also addresses existing gaps in conventional curricula, ensuring better alignment with the evolving expectations of the job market. From a managerial perspective, the benefits are equally relevant. Companies seeking candidates with a strong balance of technical expertise and interpersonal competencies can leverage these findings to refine their recruitment strategies. Organizations such as Amazon, Ferrero, and Calzedonia, which actively participated in the design and evaluation of university challenges, gain early access to students who have already demonstrated key professional attributes such as problem-solving, teamwork, and adaptability. These initiatives function as pre-recruitment platforms, allowing companies to

assess potential hires in realistic settings while simultaneously fostering stronger partnerships between academia and industry. Such collaborations contribute to a workforce that is better prepared to meet the demands of modern industries, ultimately driving innovation and operational efficiency. Despite these valuable insights, the study presents some limitations. The relatively small sample size of 108 respondents limits the generalizability of the findings. Furthermore, the sample is primarily composed of engineering and management students from Tor Vergata University of Rome, introducing potential discipline-specific biases. Future research should extend the analysis to a more diverse pool of students across multiple institutions to provide a broader understanding of these trends. Another limitation is the lack of long-term analysis regarding the impact of experiential learning on career progression and job satisfaction. Longitudinal studies could offer a more comprehensive view of how these methodologies influence professional trajectories over time. In conclusion, this study demonstrates that participation in Serious Games and University Challenges significantly enhances soft skills, strengthens alignment with professional expectations, and increases students' self-awareness in their career choices. The results emphasize the importance of formally integrating experiential learning into higher education curricula—not only to enrich academic experiences but also to equip students with the competencies required in today's competitive job market. Strengthening collaborations between academia and industry ensures that students engage with real-world problem-solving scenarios while companies gain early access to skilled talent. Moving forward, institutions and policymakers should consider embedding these activities systematically to maximize their impact. Future research could further explore feedback-driven refinements to these programs, ensuring they continue to meet the evolving needs of students and employers alike. This study adds to the growing body of research on the transformative power of experiential learning, reinforcing its role in shaping educational practices and fostering stronger connections between academic institutions and industry.

References

- Abbas, J. (2020), "Service quality in higher education institutions: qualitative evidence from the students' perspectives using maslow hierarchy of needs", *International Journal of Quality and Service Sciences*, Vol. 12 No. 3, pp. 371-384, doi: [10.1108/IJQSS-02-2020-0016](https://doi.org/10.1108/IJQSS-02-2020-0016).
- Altomari, L., Altomari, N. and Iazzolino, G. (2023), "Gamification and soft skills assessment in the development of a serious game: design and feasibility pilot study", *JMIR Serious Games*, Vol. 11, p. e45436, doi: [10.2196/45436](https://doi.org/10.2196/45436).
- Ameerbakhsh, O., Maharaj, S., Hussain, A. and McAdam, B. (2019), "A comparison of two methods of using a serious game for teaching marine ecology in a university setting", *International Journal of Human-Computer Studies*, Vol. 127, pp. 181-189, doi: [10.1016/j.ijhcs.2018.07.004](https://doi.org/10.1016/j.ijhcs.2018.07.004).
- Bertozi, G., Paciarotti, C. and Schiraldi, M.M. (2024), "Implementing serious games through a pedagogical lens in engineering education_ an experimental study", *European Journal of Engineering Education*, Vol. 49 No. 6, pp. 1131-1157, doi: [10.1080/03043797.2024.2348007](https://doi.org/10.1080/03043797.2024.2348007).
- Bischoffgrethe, A., Hazeltine, E., Bergren, L., Ivry, R. and Grafton, S. (2009), "The influence of feedback valence in associative learning", *NeuroImage*, Vol. 44 No. 1, pp. 243-251, doi: [10.1016/j.neuroimage.2008.08.038](https://doi.org/10.1016/j.neuroimage.2008.08.038).
- Burke, P.J., Crozier, G. and Misiaszek, L. (2016), *Changing Pedagogical Spaces in Higher Education: Diversity, Inequalities and Misrecognition*, Routledge.
- Colombelli, A., Loccisano, S., Panelli, A., Pennisi, O.A.M. and Serraino, F. (2022), "Entrepreneurship education: the effects of challenge-based learning on the entrepreneurial mindset of university students", *Administrative Sciences*, Vol. 12 No. 1, p. 10, doi: [10.3390/admsci12010010](https://doi.org/10.3390/admsci12010010).
- Deterding, S. (2019), "Gamification in management: between choice architecture and humanistic design", *Journal of Management Inquiry*, Vol. 28 No. 2, pp. 131-136, doi: [10.1177/1056492618790912](https://doi.org/10.1177/1056492618790912).

- Díaz-Ramírez, J. (2020), "Gamification in engineering education – an empirical assessment on learning and game performance", *Heliyon*, Vol. 6 No. 9, e04972, ISSN: 2405-8440, doi: [10.1016/j.heliyon.2020.e04972](https://doi.org/10.1016/j.heliyon.2020.e04972).
- Escolà-Gascón, Á. and Gallifa, J. (2022), "How to measure soft skills in the educational context: psychometric properties of the SKILLS-in-ONE questionnaire", *Studies In Educational Evaluation*, Vol. 74, 101155, doi: [10.1016/j.stueduc.2022.101155](https://doi.org/10.1016/j.stueduc.2022.101155).
- Fantozzi, I.C., Di Luozzo, S. and Schiraldi, M.M. (2022), "Soft skills, attitudes and personality traits in operations and supply chain management: systematic review and taxonomy proposal through ProKnow-C methodology", *Proceedings of the Summer School Francesco Turco*, available at: https://www.summerschool-aidi.it/images/papers/session_7_2022/ID_009.pdf
- Fantozzi, I.C., Di Luozzo, S. and Schiraldi, M.M. (2023), "Industrial performance measurement systems coherence: a comparative analysis of current methodologies, validation and introduction to key activity indicators", *Applied Sciences (Switzerland)*, Vol. 13 No. 1, p. 235, doi: [10.3390/app13010235](https://doi.org/10.3390/app13010235).
- Fantozzi, I.C., Di Luozzo, S. and Schiraldi, M.M. (2024), "On tasks and soft skills in operations and supply chain management: analysis and evidence from the O*NET database", *TQM Journal*, Vol. 36 No. 9, pp. 53-74, doi: [10.1108/TQM-04-2023-0104](https://doi.org/10.1108/TQM-04-2023-0104).
- Gonzalez Aleu, F., Granda Gutierrez, E.M.A., Garza-Reyes, J.A., Garza Villegas, J.B. and Vazquez Hernandez, J. (2021), "Increasing service quality at a university: a continuous improvement project", *Quality Assurance in Education*, Vol. 29 Nos 2/3, pp. 209-224, doi: [10.1108/QAE-02-2021-0020](https://doi.org/10.1108/QAE-02-2021-0020).
- Huang-Saad, A., Bodnar, C. and Carberry, A. (2019), "Examining current practice in engineering entrepreneurship education", *Entrepreneurship Education and Pedagogy*, Vol. 3 No. 1, pp. 4-13, doi: [10.1177/2515127419890828](https://doi.org/10.1177/2515127419890828).
- Jaccard, D., Bonnier, K.E. and Hellström, M. (2022), "How might serious games trigger a transformation in project management education? Lessons learned from 10 years of experimentations", *Project Leadership and Society*, Vol. 3, 100047, doi: [10.1016/j.plas.2022.100047](https://doi.org/10.1016/j.plas.2022.100047).
- Johnson, C.C., Walton, J.B., Strickler, L. and Elliott, J.B. (2023), "Online teaching in K-12 education in the United States: a systematic review", *Review of Educational Research*, Vol. 93 No. 3, pp. 353-411, doi: [10.3102/00346543221105550](https://doi.org/10.3102/00346543221105550).
- Kapp, K.M. (2012), *The Gamification of Learning and Instruction: Game-Based Methods and Strategies For Training and Education*, Pfeiffer.
- Landers, L.S. (2023), "Perceptions of middle school science teachers' use of technology: a qualitative exploratory case study", *Walden Dissertations and Doctoral Studies*, available at: <https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=12913&context=dissertations>
- Lau, A.K.W. (2015), "Teaching supply chain management using a modified beer game: an action learning approach", *International Journal of Logistics Research and Applications*, Vol. 18 No. 1, pp. 62-81, doi: [10.1080/13675567.2014.945398](https://doi.org/10.1080/13675567.2014.945398).
- Li, Y., Schoenfeld, A.H., diSessa, A.A., Graesser, A.C., Benson, L.C., English, L.D. and Duschl, R.A. (2019), "Design and design thinking in STEM education", *Journal of Research in STEM Education*, Vol. 2 No. 2, pp. 93-104, doi: [10.1007/s41979-019-00020-z](https://doi.org/10.1007/s41979-019-00020-z).
- Louw, L. and Deacon, Q. (2020), "Teaching industrie 4.0 technologies in a learning factory through problem-based learning: case study of a semi-automated robotic cell design", in *Procedia Manufacturing*, Elsevier, pp. 265-270, doi: [10.1016/j.promfg.2020.04.105](https://doi.org/10.1016/j.promfg.2020.04.105).
- Madero-Gonzalez, C., Vazquez-Hernandez, J. and Aleu, F.G. (2 January 2025), "The impact of gamification on meaningful learning and student performance in an undergraduate online engineering course", *Quality Assurance in Education*, Vol. 33 No. 1, pp. 62-79, doi: [10.1108/QAE-08-2024-0163](https://doi.org/10.1108/QAE-08-2024-0163).
- Membrillo-Hernández, J., Ramírez-Cadena, J., M., Martínez-Acosta, M., Cruz-Gómez, E., Muñoz-Díaz, E. and Elizalde, H. (2019), "Challenge based learning: the importance of world-leading companies as training partners", *International Journal on Interactive Design and Manufacturing*, Vol. 13 No. 3, pp. 1103-1113, doi: [10.1007/s12008-019-00569-4](https://doi.org/10.1007/s12008-019-00569-4).

- Pekkanen, P., Niemi, P., Puolakka, T., Pirttilä, T. and Huiskonen, J. (2020), "Building integration skills in supply chain and operations management study programs", *International Journal of Production Economics*, Vol. 225, 107593, doi: [10.1016/j.ijpe.2019.107593](https://doi.org/10.1016/j.ijpe.2019.107593).
- Robertson, S.L. (2010), "The EU, 'regulatory state regionalism' and new modes of higher education governance", *Centre for Globalisation, Education and Societies*, University of Bristol, available at: https://www.researchgate.net/publication/240518161_The_EU_'regulatory_state_regionalism'_and_new_modes_of_higher_education_governance#:~:10.1080/14767720903574033
- Rodríguez-Rodríguez, R., Alfaro-Saiz, J.J. and Carot, J.M. (2020), "A dynamic supply chain BSC-based methodology to improve operations efficiency", *Computers in Industry*, Vol. 122, 103294, doi: [10.1016/j.compind.2020.103294](https://doi.org/10.1016/j.compind.2020.103294).
- Ryan, R.M. and Deci, E.L. (2020), "Intrinsic and extrinsic motivation from a self-determination theory perspective: definitions, theory, practices, and future directions", *Contemporary Educational Psychology*, Vol. 61, 101860, doi: [10.1016/j.cedpsych.2020.101860](https://doi.org/10.1016/j.cedpsych.2020.101860).
- Salinas-Navarro, D.E. and Da Silva-Ovando, A.C. and Palma-Mendoza, J.A. (2024), "Experiential learning labs for the Post-COVID-19 pandemic era", *Education in Science*, Vol. 14 No. 7, p. 707, doi: [10.3390/educsci14070707](https://doi.org/10.3390/educsci14070707).
- Taş, N. and Bolat, Y.İ. (Eds.) (2023), *Digital Games and Gamification in Education*, ISTES Organization.
- Urgo, K. and Arguello, J. (2022), "Goal-setting in support of learning during search: an exploration of learning outcomes and searcher perceptions", *Proceedings of the 2024 Conference on Human Information Interaction and Retrieval*, doi: [10.1145/3627508.3638348](https://doi.org/10.1145/3627508.3638348).
- Vogel, S. and Schwabe, L. (2016), "Learning and memory under stress: implications for the classroom", *NPJ Science of Learning*, Vol. 1, 16011, doi: [10.1038/npscilearn.2016.11](https://doi.org/10.1038/npscilearn.2016.11).
- Zichermann, G. E (2013), *Joselin Linder. Rivoluzione della ludicizzazione*, Pubblicazione McGraw-Hill.

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