International Journal of Serious Games

ISSN: 2384-8766
https://journal.seriousgamessociety.org/

Article

An innovative Hybrid Approach in Teaching and Experiencing Sport Event Management through Serious Gaming: Bridging Theory and Practice

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Keywords:

Serious Games
Computer based learning
Virtual sport event
Management tools
Virtual football tournament
Sport event management
Top Eleven

Received: March 2025
Accepted: February 2026
Published: April 2026
DOI: 10.17083/4fasft62

Abstract

This study investigates whether the serious game Top Eleven could serve as an auxiliary educational tool for acquiring theoretical knowledge and practical experience in sport event management through a hybrid learning approach. Using a case study methodology, 44 students enrolled in a Sport Event Management course planned, organized, and managed a Virtual Intramural Football Tournament (VIFT), while 328 freshmen participated as competitors. The hybrid approach combined online game-based activities with real-life execution components, guided by the Unified Model of Events Management and Scenario-Based Education Framework. Data was collected through deliverables, written tests, and questionnaires. Results demonstrated satisfactory knowledge acquisition, notable skill development, and high satisfaction levels among both organizers and participants. These findings provide encouraging evidence suggesting that serious games like Top Eleven may function as auxiliary educational tools when integrated into structured hybrid learning models, offering an innovative framework that may help bridge the gap between theoretical knowledge and practical application in sport event management education. This study provides the first empirical evidence of integrating a commercial serious game into sport event management education through a theoretically grounded hybrid framework. The study offers a replicable educational model demonstrating how commercial games can be transformed into structured learning experiences, with implications for curriculum design in sport management and related professional education domains. Despite the limitation by the absence of a control group, the study's single-case design and specific game context suggest opportunities for future research to test this framework across diverse educational settings and different serious games platforms.

1. Introduction

Since the late 19th century, technology has played an increasingly significant role in shaping human life, dominating and influencing all sectors of society, including education at all levels. Within this evolving educational landscape, Serious Games (SGs) have gained recognition as valuable auxiliary tools for learning, particularly following the COVID-19 pandemic when traditional face-to-face education was disrupted and technology emerged as an essential educational resource.

SGs are widely used in higher education due to their ability to immerse students in realistic virtual environments that simulate real-world scenarios relevant to their training [1]. By reducing costs, time, and resource constraints [2], SGs enable students to acquire knowledge and skills through decision-making, resource management, and practical application, effectively mirroring their future professional roles. The capacity of digital SGs to simulate real-world dynamics [3] has significantly increased their adoption for educational purposes [4] in recent years[5]. According to Vlachopoulos and Makri [1, p. 1], "*As rapidly evolving technological applications, games and simulations are already widely integrated in the traditional educational process. They are deployed extensively in the field of education, with an existing body of work examining the relation of games and education*". Their effectiveness is enhanced by their ability to provide a structured, goal-oriented environment with clearly defined objectives, decision-making processes, instant feedback, and evaluation mechanisms [6].

The use of SGs in higher education has grown significantly over the past decade, particularly in simulation-based learning [7]. This rapid evolution has enabled researchers to investigate their learning effectiveness [8], [9], [10], with many scholars exploring their conversion into educational tools and identifying them as promising alternatives to traditional learning methods. SG players develop knowledge and practical skills by engaging in interactive tasks [11]. According to Zhonggen [12, p. 12], "*educational elements can be integrated into the gameplay, which will be subconsciously acquired by the players during the gaming process*". This meta-analysis [12] suggests that SGs may facilitate learners' understanding of complex concepts, enhance cognitive abilities and learning motivation, provide flexible and immersive learning experiences, improve cross-cultural communication competencies, and support collaborative and professional learning.

Despite this growing body of research, a critical gap emerges when examining SGs applications in sport management education, particularly in sport event management. A comprehensive search conducted in Scopus and Google Scholar using the keywords "sports management" and "serious games" yielded fewer than ten pertinent articles published between 2010 and 2024, with none directly addressing sport event management. This research deficiency is particularly concerning given the ongoing professionalization of sports organizations and the escalating complexity of their operational environments.

This gap is especially problematic because sport event management presents unique educational challenges that align well with SGs capabilities. The field demands practical skills that traditional instruction alone cannot fully develop, as event organizers have only one opportunity to successfully execute an event, leaving little room for real-time adjustments to organizational mistakes [13]. According to Lower et al. [13], experiential learning is a critical component of sport management education. SGs can bridge this theory-practice gap by providing a risk-free environment where students can apply concepts, test strategies, and reflect on outcomes [3] - competencies that would otherwise be acquired only through internships or real-world work experience [14].

To address this identified gap, this study introduces a novel hybrid educational approach that integrates the commercial serious game Top Eleven into sport event management curriculum through the establishment of a Virtual Intramural Football Tournament (VIFT).

This innovative framework involves two distinct groups: a) students enrolled in a Sport Event Management course, responsible for planning, organizing, executing, and evaluating the VIFT (referred to as «organizers»), and b) first-year students, participating as managers of their virtual teams within the tournament (referred to as «participants»).

The uniqueness of this approach lies in its combination of a commercially available game with structured academic curriculum, creating a hybrid learning environment that provides both theoretical knowledge acquisition and practical managerial experience.

Furthermore, following the recommendation of Afthinos et al. [10] for further research on the use of Top Eleven in sport management education, this study provides the first empirical evidence demonstrating its potential transformation into an auxiliary learning tool specifically for sport event management education.

Building on these considerations, this study aims to address the following research question: Can a Serious Game serve as an auxiliary educational tool for acquiring theoretical knowledge and gaining practical experience in sport event management through a hybrid learning approach? The objectives are: (a) to examine whether a Serious Game can facilitate the acquisition of theoretical knowledge and the development of relevant skills in sport event management; (b) to investigate the extent to which the Serious Game supports practical learning experiences within a hybrid educational framework.

2. Literature review

2.1 Digital games in education

Digital games first emerged in the late 20th century and have since become ubiquitous in students' daily lives, accessible through smartphones, tablets, and laptops [15]. Today, thousands of digital games are played by hundreds of millions of people worldwide, with most of them operating via internet connectivity. The proliferation of home internet access and mobile technology has contributed to the rise of a «digital society» [16], where gaming has become an integral part of youth culture. Reflecting this growth, the global market for SGs expanded from €2.35 billion in 2012 [17] to €83.8 billion in 2021 [18], with projections indicating further growth to €172.8 billion by 2024, reflecting a +2.1% year-on-year increase. According to Aldrich [19], digital games can be categorized into three main types: (a) video games, (b) serious games, and (c) educational simulations.

Digital games are designed to run on multiple platforms, including PCs, laptops, tablets, consoles, and mobile devices. While early digital games were primarily developed for entertainment, contemporary electronic games increasingly serve pedagogical, educational, and learning-oriented purposes. Games designed with an explicit educational goal are classified as Serious Games (SGs) [20]. According to Sawyer [21], SGs are defined by their substantial connection to knowledge acquisition, while Zyda [22] emphasizes that SGs differ from conventional video games in that their primary purpose is not entertainment, but educational outcomes.

Both digital SGs and educational simulations can generate effective learning outcomes; however, they differ in their learning environments. As Afthinos et al. [10, p. 4] noted, "serious games combine both the environment of video games and the complexity of a legal organization; therefore, they produce learning objectives in a user-friendly environment that does not exist in educational simulators." This distinction suggests that SGs may be preferable in certain educational settings, such as for children, students, and adult learners, where engagement and motivation are critical. Several studies have demonstrated that SGs are effective educational tools with notable benefits in student motivation and engagement [23]. Petridis et al. [24] argue that addressing modern educational challenges requires a broad spectrum of knowledge and skills, emphasizing the need for innovative learning tools such as

serious games and gamification applications. The integration of mobile learning into education has further reinforced the impact of SGs, offering advantages such as increased motivation, enhanced learner autonomy, and improved assessment of learning progress [25].

According to Kotsopoulos et al. [26], SGs and gamification promote behavioral and attitudinal change, enhance student participation, and improve academic performance. Empirical research has demonstrated that SGs develop cognitive skills by engaging users in structured learning activities [27] while also fostering self-awareness through goal-setting and periodic feedback mechanisms [28]. Hellström et al. [29, p. 1] highlight that SGs facilitate the transition from passive to active learning and support the development of both practical competencies and soft skills. Moreover, SGs can be instrumental in applying real-world knowledge, improving learning impact, and implementing experimental learning approaches to increase student engagement.

A growing body of research highlights the significant role of SGs in knowledge acquisition and professional skill development [29], [30], [31], [32], [33], [34]. López et al. [34] emphasize the educational potential of SGs, suggesting that gamification enhances learning effectiveness. Similarly, Riedel and Hauge [30] argue that SGs serve as a bridge for developing professional skills, while Boyle et al. [33] found that knowledge acquisition is the most common learning outcome, followed by cognitive, emotional, and behavioral changes.

SGs have been recognized as valuable educational tools for providing practical experience in a controlled, risk-free environment. This advantage is well-supported by established learning theories. According to Experiential Learning Theory [35], knowledge is constructed through concrete experiences and reflective observation, processes that SG effectively simulate through interactive scenarios. Furthermore, Constructivist Learning Theory [36] posits that learners actively construct new knowledge based on prior understanding and experience, an approach inherently embedded in game-based learning frameworks. By leveraging these theoretical perspectives, Serious Games foster deeper engagement, critical thinking, and skill acquisition in sport event management education, making them an invaluable component of hybrid learning approaches.

However, fewer studies have reported improvements in physiological, soft, or social skills. Girard et al. [31] highlights that SGs promote constructive, experiential learning, allowing students to engage in interactive and immersive experiences. Meanwhile, Wouters et al. [32] suggest that SGs integrate both cognitive and emotional learning, creating personalized learning pathways that enhance motivation and engagement. In the field of management education, Hellström et al. [29] conducted an empirical study demonstrating how SGs can transform project management training, providing qualitative evidence of their effectiveness.

The body of literature on SGs has expanded substantially over recent decades, with scholarly publications dating from the mid-1990s to the present. A quantitative review of SG literature focused on learning applications demonstrates a consistent upward trend in the number of publications since 2011, as observed across major academic databases such as Scopus and Google Scholar. In the current study, the authors have selected a total of 34 relevant articles, with publication years ranging from 2009 to 2023.

Despite the substantial growth in SGs research and applications across various educational domains, a notable gap exists in sport management education, particularly in sport event management. While the literature demonstrates that SGs may be effective in developing cognitive skills [27], practical competencies [29], and professional skills [30], [31], the application of these findings to sport event management education remains largely unexplored. This gap is particularly significant given that sport event management requires both theoretical knowledge and practical experience that traditional classroom instruction cannot fully provide. The absence of empirical studies specifically examining SGs applications in sport event management education represents a critical limitation in the current literature, especially considering the unique challenges of this field where event organizers have only one

opportunity to execute events successfully, making simulation-based learning particularly valuable.

2.2 Sport event management framework

In real-life settings, the successful management of sporting events depends on various operational factors [37], such as venue selection, accommodation, and transportation, which are not applicable in digital games. However, whether organizing a real-life or digital sports event, certain core management operations remain consistent. For instance, the management of a digital sports event involves planning, task assignment, coordination, and control [37].

Salem et al. [38] introduced the Unified Model of Event Management, a conceptual framework for event organization. According to this model, event management comprises four fundamental elements: (a) decision, (b) detailed planning, (c) implementation, and (d) evaluation. The decision process includes key steps such as defining aims and objectives, establishing a board of management, and conducting a feasibility study (Figure 1).

Detailed planning includes event definition, financial analysis, marketing, human resource management, event scheduling, and venue planning and operations management. The implementation phase involves managing contingencies, monitoring progress, and overseeing the event's closure.

The event management process concludes with the evaluation phase, which assesses the overall process, the performance of the organizers, and the outcomes of organizing a digital football tournament. Kendal et al. [39] emphasize the importance of mapping out the event and structuring all relevant aspects within a comprehensive event grid. They further recommend the use of various functional tools, such as timelines, to enhance organizational efficiency. The success of an event's planning and execution largely depends on how strictly organizers adhere to these timelines.

Similarly, Allen [40] underscores the significance of the event overview grid, which provides critical insights into event timing and orchestration. She also highlights the value of a post-event summary, describing it as an essential planning tool that helps organizers establish a structured framework for future events.

When planning a project, a common approach is to first identify the initial tasks and then proceed sequentially through the required steps. Structured Task Analysis is a method used to list the necessary actions to achieve a defined goal. This approach follows a logical organizational sequence and is based on standard planning tools [41]. Poorly planned projects are significantly more likely to encounter problems and inefficiencies. The present study focuses on an iterative, top-down approach to project planning, documented not only through a Gantt chart but also as a comprehensive project charter [42].

Following the planning phase, the implementation plays a critical role in determining the overall effectiveness of the event. According to Pinto and Slevin [43], continuous monitoring and participant feedback allow organizers to maintain control over the process and assess whether the event is progressing according to the initial projections.

The final phase, evaluation, as defined in the framework of Salem et al. [38], involves a systematic assessment of the event's impact, effectiveness, and overall value. This process includes the collection and analysis of relevant data to generate meaningful feedback for future improvements [44].

While the Unified Model of Event Management [38] provides a comprehensive framework for understanding event organization processes, the literature lacks empirical evidence on how these management principles can be effectively taught and learned through digital simulation environments. Traditional sport event management education relies heavily on theoretical instruction and limited real-world opportunities, creating a pedagogical gap between conceptual understanding and practical application. This gap becomes more pronounced when considering that the complex, multi-phase nature of event management - from decision-making

through evaluation - aligns perfectly with the structured, goal-oriented environment that SGs provide [6]. However, no studies have systematically examined how commercial serious games can be integrated with established event management frameworks to create effective hybrid learning experiences.

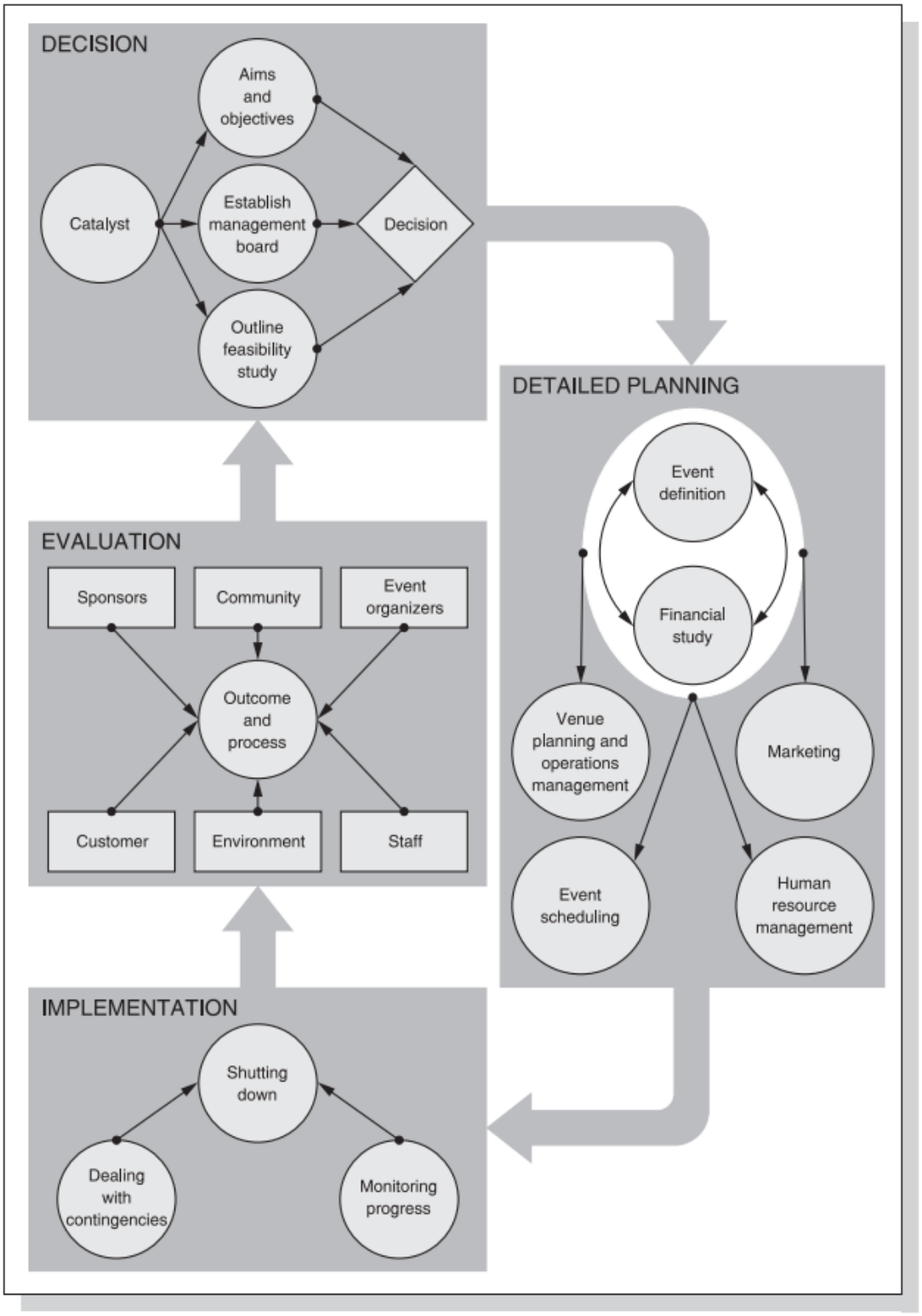

Figure 1. The Unified Model of Event Management [38].

2.3 Scenario based education framework

According to the Scenario-Based Education Framework, developed by Misfeldt [45, p. 183], "The scenario can be framed as a teaching situation …" and "… it can be framed as a simulation (that resembles a situation that it is important to master)." This educational approach, as adapted by Afthinos et al. [10], allows students to engage in specific tasks, develop projects, make decisions, and address management-related challenges, thereby acquiring knowledge, enhancing their skills, and gaining practical experience [45]. The application of the serious game Top Eleven as an educational tool for sport event management is based on a series of structured educational scenarios, designed to achieve specific learning objectives, as outlined by Afthinos et al. [10]. However, while Afthinos et al. [10] recommended further research on Top Eleven's educational potential, no subsequent studies have provided empirical evidence of its effectiveness specifically in sport event management education, representing a clear research gap that this study addresses.

3. Methodology

This exploratory case study investigates the educational implementation of a commercial sport serious game (SG) at SPESS, NKUA, addressing whether serious games can serve as auxiliary educational tools for acquiring theoretical knowledge and practical experience in sport event management through hybrid approaches. Given the limited empirical evidence on hybrid serious game approaches in sport event management education, this study serves as an exploratory investigation to establish initial feasibility and effectiveness before more controlled experimental designs. The methodology utilized Top Eleven SG to create a Virtual Intramural Football Tournament (VIFT), enabling students to assume event management roles and develop managerial competencies through gamified educational scenarios. By leveraging the game's friendly match organization feature, students engaged in practical event planning and execution within a controlled virtual environment, facilitating knowledge acquisition and skill development.

3.1 Research design

This study employs an exploratory single-group case study design, appropriate for investigating innovative interventions where limited prior research exists [46]. The research design encompasses three core methodological components: a) Implementation of Salem et al.'s [38] structured framework for analyzing decision-making, planning, implementation, and evaluation—fundamental elements integrated into the virtual tournament environment through serious gaming. This model ensures comprehensive examination of how serious games support key competency development in simulated sports event management. Educational scenarios, developed following Misfeldt's [45] Scenario-Based Education Framework as adapted by Afthinos et al. [10], provide the foundation for student roles as event organizers. Students design, organize, and implement the VIFT, performing tasks including participant invitations, tournament draws, and scheduling. These scenarios, grounded in event management literature and practical experience, enable students to assume authentic organizational responsibilities. b) Administration of written knowledge assessments evaluating students' comprehension and acquisition of tournament organization principles and processes, c) Participant evaluation of the tournament experience, gathering feedback on organizational effectiveness and identifying areas for future improvement.

A single-group case study design was chosen given that in an exploratory study examining an innovative approach in an under-researched domain, the primary aim was to investigate the feasibility and initial effectiveness of the hybrid model rather than establish definitive causal relationships. Additionally, the immersive nature of the VIFT required institution-wide participation across multiple cohorts, making it logistically and ethically challenging to

withhold the intervention from a control group or establish a comparable control condition. Furthermore, this design allowed for rich, contextualized data collection that provides valuable preliminary insights for hypothesis generation and framework refinement in future controlled studies. While this limits causal inference, it establishes a foundation for more rigorous experimental investigations.

3.2 Study procedure

The laboratory procedure utilized Top Eleven platform to simulate a football tournament integrated with educational scenarios in hybrid format. Following initial briefings on the VIFT purpose and philosophy, participants established an Organizing Committee (OC) comprising sports and marketing departments.

The marketing department executed two primary functions: a) creating and managing official website and Facebook communication channels, and b) developing sponsorship programs. Despite the virtual format, the marketing department operated comprehensively, securing real-world sponsorships from organizations including Adidas Hellas and Hellenic Football Federation, providing trophies and prizes for the virtual closing ceremony.

Subsequent planning phases involved developing Project Charter documentation, detailed timetables, and Structured Task Analysis for both departments, alongside formulating tournament Rules and Regulations. Upon completion, organizers utilized SPESS e -class platform to distribute VIFT Participation Forms, Terms and Conditions, and regulations to virtual team managers.

OC members then assumed Project Manager (PM) roles, overseeing the group stage phase. Each PM managed one or two groups from 82 randomly divided four-team groups, sending Facebook friend requests to assigned team managers via email. PMs conducted Technical Meetings through Webex platform, explaining tournament objectives, operational procedures, and regulations while distributing timetables and competition schedules. Participants' responsibilities included inviting opponents to scheduled friendly matches and reporting results to assigned PMs.

Following VIFT protocol, home teams invited opponents to friendly matches via Top Eleven platform, creating an exclusive SPESS intramural championship. Home team managers reported final scores through result screenshots to their PMs, while the marketing department updated group scoreboards and maintained the official website. The tournament facilitated continuous monitoring and evaluation, with PMs developing problem-solving and decision-making skills by addressing emerging issues. For example, common operational challenges included managing scheduling conflicts when participants missed matches (resolved through rescheduling protocols), addressing technical issues with game platform connectivity (resolved through alternative communication channels), and handling disputes regarding match results (resolved through screenshot verification procedures). PMs documented these issues in daily reports and developed standardized response protocols. The group stage concluded with winning teams advancing through knockout rounds to the final match. Upon tournament completion, the OC conducted comprehensive evaluation assessing organizational effectiveness, educational objective alignment, and participant experience. Figure 2 provides complete procedural documentation.

3.3 The SG Top Eleven

Top Eleven is a free-to-play digital football management game developed by Nordeus, launched in 2010 and available in 31 languages. It can be played on PCs, laptops, mobile phones, and tablets via Facebook. Unlike traditional football simulation games that emphasize player avatars, Top Eleven focuses primarily on decision-making, and user participation is not required during matches.

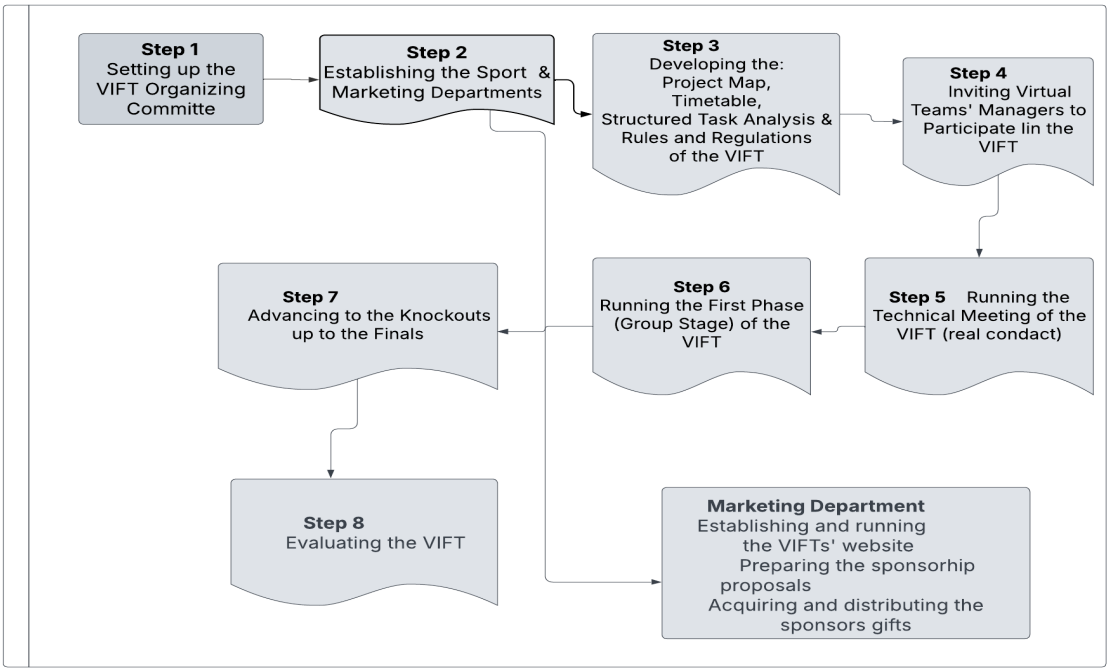

Figure 2. The procedure of the study.

The core gameplay concept is built around four key elements: a) club resource development, b) budget management, c) investment in assets, and d) improving team efficiency (Photos 1 & 2). The relevant management model, as illustrated by Afthinos et al. [10], is presented in Figure 3.

In Top Eleven, the player assumes the role of a football club manager, responsible for leading their team to success and championship titles. The game's structure integrates fundamental management functions commonly found in a conventional sports club, simulating various sports management roles, including that of a sport event manager. Specifically, Top Eleven enables users to manage teams and participate in multiple competitions and tournaments, such as:

- League
- Champions League
- Super League
- Cup
- Super Cup
- Association Tournaments
- Special Tournaments

On top of these, the users of the game can arrange:

- Friendly matches, and Friendly Tournaments (Photos 3 & 4)

The use of Top Eleven as an educational simulator is based on its ability to allow club managers to organize friendly matches, thereby enabling the creation of virtual, independent friendly tournaments. In this football management SG, fixtures are predetermined, and matches are automatically played by the game, except for friendly matches, which require user involvement. The overall methodological approach to teaching sport event management is hybrid, as the management of the VIFT was primarily digital, while certain management and marketing aspects were conducted in real-life settings

Photo 1. Club's Financial Overview

Photo 2. Club's facility development

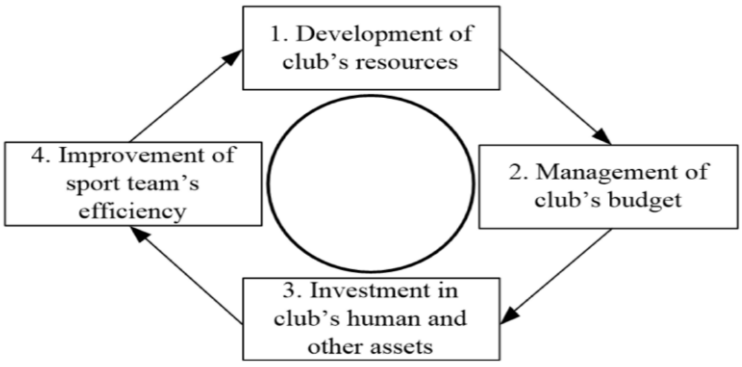

Figure 3. Basic game concept [10].

Photo 3: Friendly Matches

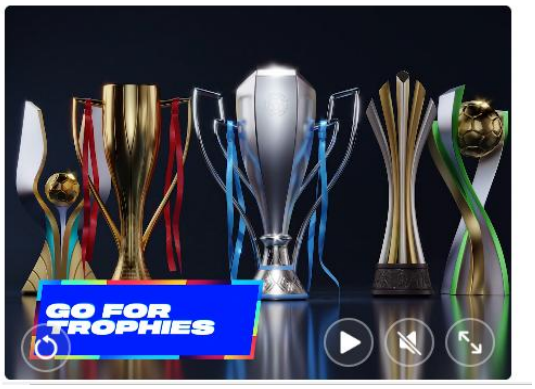

Photo 4: Various Competition Tournaments

3.4 Population and sample

The population of this study consisted of N = 372 students from the School of Physical Education and Sport Science (SPESS), divided into two groups: a) the organizers (N = 44), comprising senior students majoring in sport management, who were enrolled in the Sport Event Management class. b) The participants (N = 328), consisting of freshman students enrolled in an introductory Sport Management class, who acted as football team managers for the virtual football teams (Table 1).

Table 1. Population of the study

Role	Frequency f	Percentage %
Organizers (senior students)	44	11.83
Participants (freshmen students)	328	88.17
Total	372	100

Convenience sampling was employed due to the exploratory nature of the study, practical constraints within the institutional setting, and the requirement for organic integration into existing coursework. While this sampling approach limits generalizability beyond the specific institutional context, it enabled authentic implementation within the natural educational environment and provided rich preliminary data for this emerging area of research.

3.5 Data collection instruments and analysis

The Sport Event Management class combines theoretical instruction with the development of practical sport event management skills through class laboratories. The laboratory approach follows a hybrid model, as the intended skills were cultivated both virtually (through the SG) and in real- world settings (e.g., direct communication with stakeholders).

The VIFT process was structured based on the two previously mentioned models: the Unified Model of Events Management [38] and the Scenario-Based Education Framework [45]. All students participated in this study as part of their class assignments. Following the model of Salem et al. [38], once the decision to create the event was taken, the next step was detailed planning, which involved tasks such as establishing an organizing committee, creating announcements, and mapping out the tournament. Subsequently, the tournament was implemented, including activities such as technical meetings, draws, match execution, and score table updates. Finally, an evaluation of the tournament was conducted.

In line with this model, a scenario was developed in which all students enrolled in the event organization course assumed roles as organizing committee members and project managers, each responsible for managing the participating teams assigned to their group. Within this framework, their responsibilities included: a) communicating with participants, b) sending informational materials, c) resolving administrative issues, and d) making managerial decisions. The data collection process was carried out through: a) a set of deliverables, b) a written test, assessing the sport event management skills acquired by the organizers, and c) the Virtual Environment Evaluation Questionnaire, developed by Chertoff et al. [47], which evaluated both the organizers' sport management efficiency and the overall VIFT experience. The data analysis was conducted using descriptive statistics to summarize the key findings. To examine differences between participants based on gender and prior experience, an independent samples t-test was applied. Data analyses focused on descriptive statistics and independent samples t-tests are appropriate for this exploratory phase of research [48]. These analytical approaches allowed for comprehensive description of learning outcomes and initial examination of group differences, establishing baseline findings that can inform more sophisticated multivariate analyses in future controlled studies with larger, more diverse samples. Additionally, a correlation analysis was performed to examine the relationship between the VIFT evaluation results and the organizers' assessments, providing insights into the validity of the evaluation process.

3.5.1 Deliverables

The deliverables, assigned as class assignments related to sport event management skills development, were an integral part of the official assessment of the organizers before, during, and after the completion of the VIFT. The organizers were required to submit a set of event management tools to the class instructor, including the organization chart, project charter (map), event timetable, and Structured Task Analysis, among others. The primary objective of the deliverables was to enhance students' skills in areas such as timetable preparation, competition draws and scheduling, and scoreboard arrangements. The evaluation of these deliverables was conducted using a 1 to 10 grading scale.

3.5.2 Knowledge written test

The written test was designed to assess students' acquired theoretical knowledge on sports event management topics and was administered after the completion of the VIFT. The test development followed a systematic validation process to ensure content validity and reliability.

The test was initially developed by the class instructor based on the course learning objectives and VIFT activities. Subsequently, the instrument underwent content validation by a panel of three sport management experts from SPESS faculty, who independently reviewed each question for relevance, clarity, and alignment with course objectives. The expert panel achieved 100% agreement on question relevance, with minor revisions made to improve clarity based on their recommendations.

The final test consisted of 20 questions (12 multiple-choice and 8 open-ended), covering six key areas of event organization: sports tournament planning (e.g., "What do you know about the project charter map?"), competition announcements (e.g., "What is included in a football tournament general announcement?"), participants' management (e.g., "What kind of information should be included in a registration form?"), technical meetings (e.g., "What kind of information should be communicated to participants during a technical meeting?"), match calculation ("Which mathematical type calculates the total number of matches in a robin round system?"), and qualification criteria (e.g., "What are the most common qualification criteria for teams that are tied in the standings in a robin round system?").

The assessment was conducted using a standardized 1 to 10 grading scale, with detailed rubrics provided for open-ended questions to ensure consistent evaluation.

3.5.3 VIFT evaluation

The VIFT evaluation utilized an adapted version of the Virtual Environment Evaluation Questionnaire developed by Chertoff et al. [47]. The adaptation process involved systematic modification to align the instrument with the specific objectives and context of sports event management education. The original questionnaire was modified through a two-stage process. First, questions irrelevant to the sport event management context were removed, while others were adapted to reflect the specific learning objectives of the VIFT. Second, the adapted questionnaire underwent face validity assessment by a committee of three SPESS faculty members with expertise in sport management and educational assessment. The committee reviewed each item for clarity, relevance, and appropriateness, approving the final version without recommending further changes. The questionnaire included 27 questions in total; internal consistency was assessed for the Likert-type scale items only (demographic and open-ended questions were excluded). The final instrument evaluated two primary dimensions (subscales) measured with 17 Likert-type items: (a) organizers' efficiency in managing the virtual tournament (9 items; e.g., "The instructions I received were clear" and "The group leader kept us informed in a timely manner"), and (b) overall VIFT organization and implementation quality (8 items; e.g., "The tournament was very well designed" and "The participation/registration process was simple and easy"). Responses were recorded using a 5-point Likert scale (1 = Absolutely Disagree, 5 = Absolutely Agree). Internal consistency was good for subscale (a) (Cronbach's $\alpha = .88$; McDonald's $\omega = .89$) and acceptable for subscale (b) (Cronbach's $\alpha = .75$; McDonald's $\omega = .77$). For completeness, we also report reliability for the combined set of Likert-type items across both subscales (17 items; Cronbach's $\alpha = .857$; McDonald's $\omega = .883$; listwise N = 205). In addition, an exploratory factor analysis (principal axis factoring with direct oblimin rotation) was conducted on the 17 Likert items. The questionnaire was distributed via Google Forms to all 328 participants (freshman students), achieving a response rate of 62.8% (206 complete questionnaires).

3.6 Study limitations

This study acknowledges several methodological limitations that may impact the generalizability of findings. First, the absence of a control group limits our ability to establish causal relationships between the serious game intervention and learning outcomes. The study design employed a single-group pre-post assessment approach, which, while appropriate for exploratory case study research, does not allow for direct comparison with traditional teaching methods [46]. This limitation was considered acceptable given the study's exploratory purpose - to establish initial feasibility and generate hypotheses - rather than test causal hypotheses.

Second, the study utilized convenience sampling, selecting participants from available students enrolled in Sport Event Management and introductory Sport Management courses at SPESS, NKUA. This sampling approach, while practical for educational research within institutional constraints, limits the external validity and generalizability of findings to broader student populations, different educational contexts, or other institutional settings.

Third, data analysis relied primarily on descriptive statistics and t-tests, which, while appropriate for exploratory investigations, do not capture potential interaction effects, predictive relationships, or complex patterns that multivariate techniques might reveal. Therefore, future studies with larger samples and experimental designs would benefit from structural equation modeling, multivariate analysis of variance, or regression analyses to examine the interplay between student characteristics, learning processes, and outcomes.

Fourth, while this was partially mitigated through triangulation with objective performance assessments (deliverables and written tests) the study does not explicitly address potential social desirability bias or the coupling between grading and deliverable assessment, which may have influenced students' responses and performance. Future research should implement anonymous evaluation procedures and separate grading from research data collection to reduce these threats to validity [49].

Fifth, the study does not account for potential novelty effects, whereby the innovative nature of the serious game intervention may have temporarily enhanced student engagement and performance. Longitudinal studies would be necessary to determine whether observed learning outcomes persist over time and whether student motivation remains elevated after the novelty diminishes.

These limitations are characteristic of exploratory case study methodologies but provide essential groundwork for more rigorous experimental investigations. The findings should be interpreted as preliminary evidence establishing feasibility and initial effectiveness, generating hypotheses for future controlled studies rather than offering definitive conclusions about intervention efficacy.

4. Results

In line with the adopted methodology, this section presents the study's findings, which collectively address the main research question. The results are structured as follows:

- Demographic data,
- Analysis of deliverables (examining the acquisition of skills),
- Written test results (assessing the acquisition of knowledge), and
- VIFT evaluation (demonstrating the practical application of knowledge, abilities, and skills).

This structured approach ensures a comprehensive examination of how serious games contribute to learning and skill development in the context of sports event management.

4.1 Demographics

Research Group – Organizers: The organizers' group (N = 44) was predominantly composed of women (N = 31, 70.45%), while men constituted 29.55% (N = 13). The average age of the

organizers was 22.88 years (min = 21, max = 28). Research Group – Participants: The participants' group (N = 328) consisted of freshman students enrolled in the introductory Sport Management class. The evaluation questionnaire was completed by N = 206 students (response rate = 62.80%), with an almost equal distribution between men (N = 100, 48.54%) and women (N = 106, 51.45%). The average age of participants was 19.32 years (min = 18, max = 28). Most participants (N = 155, 75.2%) reported having no prior experience with serious games.

4.2 Deliverables: evaluation of organizers' skills

The organizers' skills in sport event management were assessed through the evaluation of deliverables, which formed part of their official class grading procedure. The mean score for the deliverables was M = 8.54, SD = .59 (see Table 2).

4.3 Written test: evaluation of theoretical knowledge in sport event management

The evaluation of the organizers' theoretical knowledge in sport event management was conducted at the conclusion of the VIFT. To assess both the level of knowledge acquired through the gamification process and the effectiveness of the educational scenarios presented in Table 2, the organizers completed a written knowledge test upon the completion of the tournament.

A total of N = 29 organizers participated in the test, of whom 24.1% were men (N = 7) and 75.9% were women (N = 22). As shown in Table 3, the overall mean score of the organizers was M = 6.61 (SD = 2.46) on a 0–10 scale, which is well above the passing threshold ($t = 3.522$, $df = 28$, $p < .001$; 95% CI [5.67, 7.54]). The effect size relative to the passing threshold was Cohen's d = .65, 95% CI [.25, 1.05], indicating a medium to large effect.

When considering gender differences, the mean performance for men was M = 5.34 (SD = 2.48), while for women, it was M = 7.01 (SD = 2.36). An independent samples t-test shows that this difference in knowledge acquisition between genders was not statistically significant ($t = -1.606$, $df = 27$, $p = .120$). The estimated mean difference (women-men) was 1.67 (95% CI [-.46, 3.79]), and the effect size was moderate (Cohens's d = .70, 95% CI [-.17, 1.57]).

Regarding the impact of prior knowledge in sport event management, the t-test analysis ($t = -2.264$, $df = 27$, $p = .032$) showed that organizers with prior knowledge (M = 8.04, SD = 1.49) achieved significantly higher academic performance compared to those without prior knowledge (M = 5.96, SD = 2.55), with a mean difference of 2.08, 95% CI [.20, 3.97], and a large effect size (Cohen's d =.91, 95% [.09, 1.73]).

Table 2. Deliverables: Educational scenarios, objectives & instructor's evaluation

Salem *et al.* [38] Model	Educational Scenario / Task	Learning Objective / Skill Developed	Instructor's Mean Evaluation Score (M)
Decision	1. Create the event's organization chart	Create an event org chart using office software	7.85
	2. Create the project map of the event	Develop a project map using Word/Excel	8.24
Detailed Planning	3. Create a timetable for the event	Develop timetables using Excel	7.05
	4. Produce a Structured Task Analysis	Conduct structured task analysis using Word/Excel	7.43
	5. Design & distribute registration forms	Use Word/Google Forms to collect team registrations	8.32
	6. Accept teams and conduct competition draws	Use office tools and random.org for draw process	8.75
	7. Group teams and create a competition schedule	Create schedules using Word/Excel	8.80

Salem *et al.* [38] Model	Educational Scenario / Task	Learning Objective / Skill Developed	Instructor's Mean Evaluation Score (M)
	8. Communicate with team managers	Develop verbal and written communication skills	8.75
	9. Execute technical meeting (VIFT)	Practice public speaking and information delivery	8.90
	10. Develop the VIFT website	Design and publish websites using open platforms	8.74
	11. Prepare sponsorship proposals	Understand sponsorship planning processes	8.34
Implementation	12. Run VIFT – problem solving	Apply problem-solving during live event operations	8.97
	13. Run VIFT – decision making	Develop critical decision-making abilities	9.13
	14. Update scoreboard	Learn scoreboard management using Word/Excel	9.15
	15. Declare promoting teams	Apply competition rules and scoreboard logic	9.15
	16. Maintain VIFT website	Gain skills in website administration	8.84
	17. Implement sponsorship program	Learn sales, negotiation, and event closing	8.24
Evaluation	18. Evaluate the VIFT	Learn event evaluation, issue analysis, solution proposals	9.07

Table 3. Written test: Theoretical knowledge on sport event management by gender and prior experience

Category	Mean score (range 0-10)	Standard deviation	Frequency f	Percentage %
Men	5.34	2.48	7	24.1
Women	7.01	2.36	22	75.9
With prior experience	8.04	1.49	9	31
Without prior experience	5.96	2.55	20	69
Total	6.61	2.46	29	100

4.4 VIFT evaluation: organizers, organization & implementation

Following the completion of the VIFT, participants evaluated the organizers' efficiency in sport event management (subscale a) as well as the overall organization and implementation of the VIFT (subscale b) using the Virtual Environment Evaluation Questionnaire. To support the use of the two subscale scores reported below, an exploratory factor analysis indicated a two-factor structure for the 17 Likert-type items (KMO = .857; Bartlett's $\chi^2(136) = 1462.04$, $p < .001$; see Table 8). The questionnaire was completed by N = 206 participants, of whom 51.45% were women and 48.54% were men.

As shown in Table 4, the organizers received high ratings from the participants regarding their sport event management efficiency, with a mean score of M = 4.82 on a 1–5 Likert scale (SD = .36). Responses were recorded on a 1–5 Likert scale, where:

- 1 = Very Poor
- 2 = Poor
- 3 = Satisfactory
- 4 = Very Good
- 5 = Perfect

The results indicate that most participants (N = 156, 75.72%) rated the VIFT management as «Perfect», while an additional 18.92% (N = 39) rated it as «Very Good». The overall mean score was M = 4.82 (SD = .36), reflecting high level of satisfaction with the event management. The full results are presented in Table 4.

Regarding gender differences, the t-test analysis (t = .896, df = 204, p = .371) indicated that there was no statistically significant difference between men (M = 4.84, SD = .29) and women (M = 4.79, SD = .41) in their evaluation of the overall effort of the organizers (see Table 5; 95% CI for the mean difference [-.14, .05]; Cohens's d = -.13, 95% CI [-.40, .15]).

The frequency distribution of the VIFT evaluation results is presented in Table 6, using a 1–5 Likert scale (1 = Very Poor, 5 = Perfect). According to the results, 48.06% (N = 99) of participants rated the VIFT as «Very Good», while an additional 21.84% (N = 45) evaluated it as «Perfect». Conversely, 26.70% (N = 55) rated the VIFT as «Satisfactory». The overall assessment was high, with a mean score of M = 4.45 on a 1–5 Likert scale (SD = .44). Regarding the gender differences, the t-test analysis (t = -.498, df = 204, p = .619) indicated that there was no statistically significant difference between men (M = 4.44, SD = .43) and women (M = 4.47, SD = .46) in their evaluation of the VIFT (see Table 7; 95% CI for the mean difference [-.15, .09]; Cohens's d = -.07, 95% CI [-.34, .20]).

The relationship between VIFT evaluation scores and the organizers' assessments was examined using Pearson's correlation coefficient (r). The analysis revealed a moderate positive correlation (r = .497, 95% CI [.39, .59], p < .001), indicating that higher VIFT evaluation scores were associated with more favorable assessments of the organizers. In terms of effect size, this association corresponds to a large effect (Cohen's d ≈ 1.15, 95% CI [.94, 1.48]).

Table 4. Evaluation of the organizers' sport event management efficiency

Evaluation of the organizers' efficiency	Frequency f	Percentage %
1 Very Poor	1	.49
2 Poor	3	1.47
3 Satisfactory	7	3.40
4 Very good	39	18.92
5 Perfect	156	75.72
Total	206	100

Table 5. Evaluation of the organizers' sport event management efficiency by the participants' gender

Gender	Mean score (scale 1-5)	Standard deviation	Frequency f	Percentage %
Men	4.84	.29	100	49
Women	4.79	.41	106	51
Total	4.82	.36	206	100

Table 6. Evaluation of the VIFT by the participants

VIFT Evaluation Rating	Frequency f	Percentage %
1 Very Poor	1	.49
2 Poor	6	2.91

3 Satisfactory	55	26.70
4 Very good	99	48.06
5 Perfect	45	21.84
Total	206	100

Table 7. Evaluation of the VIFT by gender

Gender	Mean score (scale 1-5)	Standard deviation	Frequency f	Percentage %
Men	4.44	.43	100	48.54
Women	4.47	.46	106	51.46
Total	4.45	.44	206	100

Table 8. Pattern matrix (PAF; direct oblimin) for the VIFT evaluation scale items

Item	Organizers' efficiency	VIFT quality	h^2
1	—	.546	.360
2	—	.649	.422
3	—	.589	.392
4	—	.406	.303
5	—	.624	.347
6	—	.382	.142
7	—	.627	.329
8	—	.389	.192
9	.697	—	.512
10	.580	—	.317
11	.623	—	.439
12	—	.342	.246
13	.751	—	.544
14	.599	—	.515
15	.803	—	.585
16	.852	—	.691
17	.729	—	.60

Note. Loadings < .30 suppressed. PAF = principal axis factoring; rotation = direct oblimin.

5. Discussion

The purpose of this study was to explore the feasibility of transforming a Serious Game (SG) into an auxiliary teaching tool for sport event management education using a hybrid learning approach. The study aimed to determine whether such an approach could enable students to acquire knowledge, develop skills, and gain practical experience in sport event management. The results provide encouraging evidence suggesting that commercial serious games may be

effectively integrated into sport event management curriculum when combined with structured educational frameworks.

According to McGonigal [6], a game can be educational if it possesses clearly defined goals. In line with the work of Afthinos *et al.* [10], this study suggests that Top Eleven may fulfill an educational objective by providing Sport Event Management students with knowledge, skills, and hands-on experience through structured educational scenarios designed by the instructor (see Table 2). Essentially, the game was augmented with sport event management scenarios, aligning with an innovative «learn-by-play» educational methodology that transforms a SG into a learning tool [50].

The VIFT was designed as a controlled football tournament managed exclusively by students enrolled in the Sport Event Management class. Utilizing the SG Top Eleven, the tournament was developed based on two established theoretical models: a) the Unified Model of Events Management [38], and b) the Scenario-Based Education Framework [45]. Through this innovative alternative teaching method, students engaged in a dynamic, practice-oriented learning process, using various sport management and marketing tools [10], [51].

Initially, following Misfeldt's [45] model, students created an event organization scenario. In line with the first phase of Salem *et al.*'s [38] model, organizers defined the mission statement, set the VIFT goals, and established the Organizing Committee (OC). The second phase involved practical event planning, in accordance with Kendal *et al.* [39], where students utilized planning tools and developed a Structured Task Analysis, a fundamental tool in event management [41]. During the implementation phase (third element of the model), organizers gained hands-on experience in managing operations and resolving managerial challenges. For example, PMs encountered scheduling conflicts when multiple matches were scheduled simultaneously, which they resolved by implementing staggered time slots. Technical issues arose when some participants experienced connectivity problems with the Facebook platform (in which Top Eleven runs), leading PMs to develop backup communication protocols via email and messaging apps. Additionally, disputes over match results required PMs to establish a formal verification process using timestamped screenshots, demonstrating problem-solving and decision-making competencies in real-time operational contexts. Finally, in the evaluation phase (fourth element), both the VIFT and the organizers were assessed by participants, while the organizers were additionally evaluated by the class instructor through a written test and deliverables.

From a marketing perspective, the organizers created a website as the primary communication and information tool for the VIFT. Additionally, they designed and implemented a sponsorship program, which enabled them to secure sponsorships, leading to the awarding of in-kind contributions from sponsors during the virtual closing ceremony.

The results suggest that commercial serious games may be effectively integrated into sport event management curriculum when combined with structured educational frameworks. The findings indicate that the sport event management skills outlined in Table 2 were effectively developed and positively evaluated by the class instructor, supported by high-quality deliverables, written test performance, and successful VIFT completion.

The VIFT implementation through Top Eleven serious game yielded significant insights into integrating commercial games with structured educational frameworks. Students progressed through Misfeldt's [45] scenario-based model and Salem *et al.*'s [38] four-phase Unified Model, from mission definition to comprehensive evaluation, while developing practical deliverables including website development, sponsorship programs, and securing in-kind contributions.

These findings align with research demonstrating that serious games foster experiential, student-centered learning [51] though our study extends this by embedding sport management and marketing tools within the game environment. The successful deliverable completion

validates findings that experiential learning bridges the gap between academic learning and professional readiness [52].

However, our approach reveals critical distinctions from existing literature. First, while previous research identifies expected learning performance as the primary factor in serious game acceptance [50], our dual-framework integration [38], [45] demonstrates that structured scaffolding may elevate engagement beyond mere acceptance to measurable skill development in operational planning, stakeholder management, and marketing communications. Second, unlike studies where serious games primarily target cognitive outcomes [1], the VIFT deliberately emphasized behavioral competencies through hands-on operational challenge s and sponsorship negotiations, addressing both technical and soft skills - a more holistic approach than typical implementations.

The sponsorship component particularly demonstrates what research describes as professional role alignment [52], suggesting commercial serious games with authentic scenarios may simulate sport event marketing complexity better than traditional case studies. This raises question about assumptions that purpose-built educational games are inherently superior, supporting emerging research on adapting existing platforms for educational purposes [50]. Our findings indicate the educational framework surrounding the game - not the game's design alone - maybe acritical factor in determining effectiveness.

Nevertheless, systematic reviews note many serious game studies lack long-term follow-up [53], highlighting the need for future research examining whether VIFT-developed skills translate to actual professional performance beyond controlled academic environments.

5.1 Theoretical knowledge acquisition and skill development

The findings suggest that the hybrid approach may facilitate both theoretical knowledge acquisition and practical skill development. The written test results (M = 6.61) indicate satisfactory knowledge acquisition, aligning with Zhonggen's [12] meta-analysis findings that educational elements integrated into gameplay are subconsciously acquired during the gaming process. More significantly, the high scores in deliverables assessment (M = 8.54) suggest that the hybrid model was particularly effective in developing practical competencies, supporting Hellström et al.'s [29] argument that serious games facilitate the transition from passive to active learning while fostering both practical competencies and soft skills.

The above findings also reveal an asymmetry, between theoretical knowledge acquisition (M = 6.61) and practical skill development (M = 8.54), with practical competencies exceeding theoretical performance by nearly 30%. This differential warrants critical examination, as it challenges conventional assumptions about learning hierarchies in professional education. Why did practical skills significantly outperform theoretical knowledge? Several explanations emerge from educational theory and empirical evidence.

Initially, the game-based environment provided immediate, contextualized application of theoretical concepts, creating what Kolb et al. [35] describe as "concrete experience" – the foundation of experiential learning. Unlike traditional didactic instruction where theory precedes practice, the hybrid model embedded theoretical concepts within authentic problem-solving scenarios, potentially enhancing retention and application.

Moreover, this finding critically interrogates traditional lecture-based pedagogies dominant in sport management education. Compared to conventional teaching methods that prioritize knowledge transmission through passive reception, the hybrid approach engaged students in active knowledge construction. While Zhonggen's [12] meta-analysis found that educational elements are subconsciously acquired during gameplay, our results suggest that when combined with real-world execution components, this acquisition may become particularly robust for procedural and tacit knowledge.

Furthermore, the superior practical performance may reflect assessment authenticity. Deliverables required students to produce tangible outputs (organization charts, timetables,

sponsorship proposals) evaluated against professional standards, whereas the written test assessed decontextualized theoretical recall. This raises important questions about what constitutes "knowing" in professional education – a debate central to competency-based education frameworks [54].

Comparison with existing research reveals both convergence and divergence. Like Hellström et al.'s [29] findings that serious games facilitate active learning and soft skill development, our results demonstrate practical competency gains. However, unlike studies showing equivalent gains in theoretical and practical domains [32], our data suggests that hybrid models may create differential learning pathways favoring experiential over declarative knowledge. This finding differs from assumptions in Girard et al.'s [31] work that serious games equally promote theoretical understanding and practical application.

The positive correlation ($r = .497$, $p < .001$) between VIFT evaluation scores and organizers' assessments provides preliminary evidence supporting the validity of the evaluation framework, suggesting that the serious game environment may have captured required competencies. However, the moderate rather than strong correlation (explaining only 25% of variance) suggests that participant satisfaction and organizer competence, while related, represent distinct constructs – a nuance absent in previous serious game evaluation studies.

Gender differences proved non-significant in both theoretical knowledge ($t = -1.606$, $p = .792$) and VIFT evaluation ($t = -.498$, $p = .619$). This null finding differs from documented gender disparities in gaming contexts where males typically demonstrate superior engagement and performance [55], [56]. The absence of gender effects when serious games are embedded within structured educational frameworks suggests traditional gaps may be mitigated through pedagogical design [57]. The gender parity likely reflects the hybrid model's dual emphasis on virtual gameplay and authentic professional tasks. Women's comparable theoretical performance combined with equal practical evaluation provide support for social constructivist views attributing performance differences to socialization rather than inherent capabilities [58].

Prior experience effects revealed a more nuanced pattern. Students with prior experience significantly outperformed novices in theoretical knowledge ($M = 8.04$ vs. $M = 5.96$). This is consistent with schema theory's prediction that prior knowledge structures facilitate learning [59]. Critically, however, this advantage did not extend to practical execution—all students demonstrated high deliverable quality ($M = 8.54$). This suggests the hybrid model may democratize practical skill acquisition while rewarding prior knowledge theoretically, providing scaffolding that enables novices to achieve practical competency independent of theoretical mastery.

Several factors merit consideration for international adaptation of this hybrid learning model. Regarding cultural adaptability, while football's global popularity enhances transferability, educational preferences and gaming acceptance vary culturally [60], and hierarchical educational systems may require additional scaffolding to support student autonomy in game-based learning. From a technological infrastructure perspective, implementation depends on digital access and connectivity. Top Eleven's multi-platform availability enhances accessibility, yet the digital divide remains a barrier in resource-constrained contexts [61], where low-bandwidth alternatives or greater emphasis on real-world components may be necessary. Institutional flexibility represents another critical consideration, as the model requires curricular flexibility for semester-long authentic projects. While rigid systems may constrain implementation, the framework's modular design - discrete scenarios aligned with specific objectives - allows institutional adaptation across diverse educational contexts. Localization considerations are equally important: Top Eleven's 31-language availability facilitates implementation, but developing culturally appropriate scenarios requires localized expertise in sport management practices, sponsorship norms, and regulatory frameworks [62]. Finally, regulatory considerations must be addressed, as student engagement

with commercial entities requires navigation of institutional policies, liability, and ethical boundaries that vary significantly across educational systems.

5.2 Hybrid learning model effectiveness

The study's hybrid approach, combining digital game elements with real-world components, addresses a critical gap identified in sport event management education. The integration of Salem et al.'s [38] Unified Model of Events Management with Misfeldt's [45] Scenario-Based Education Framework created a comprehensive learning environment that transcended traditional classroom limitations. This approach directly addresses Lower et al.'s [13] assertion that experiential learning is critical in sport management education, particularly given that event organizers have only one opportunity to execute events successfully.

The successful implementation of real-world marketing activities, including securing actual sponsorships from organizations like Adidas Hellas and Hellenic Football Federation, demonstrates that the hybrid model may help bridge the theory-practice gap. This finding supports the theoretical foundation provided by Constructivist Learning Theory [36], which emphasizes that learners actively construct knowledge through prior understanding and experience. The integration of authentic marketing tasks with virtual tournament management created meaningful learning experiences that traditional instruction alone cannot provide.

The high satisfaction ratings from participants (Organizers Evaluation M = 4.82; VIFT Evaluation M = 4.45) suggest that the hybrid approach not only facilitated learning but also enhanced student engagement and motivation. This aligns with research by Kotsopoulos et al. [26], who found that serious games and gamification promote behavioral change, enhance student participation, and improve academic performance.

5.3 Implications for sport event management education

The findings have significant theoretical and practical implications for sport event management education. Theoretically, the study provides first empirical evidence demonstrating how commercial serious games may be systematically integrated into sport management curriculum through structured educational frameworks. This addresses the research gap identified in the literature, where fewer than ten pertinent articles were found examining serious games applications in sports management education between 2010 and 2024.

From a practical perspective, the study offers a replicable educational model that enables sport event management educators to provide students with hands-on experience in a controlled, risk-free environment. The successful application of both the Unified Model of Events Management [38] and Scenario-Based Education Framework [45] creates a structured approach that can be adapted to different educational contexts and serious game platforms.

The impact of prior experience on performance (M = 8.04 for experienced vs. M = 5.96 for non-experienced students) suggests that the hybrid model can accommodate students with varying backgrounds while still providing meaningful learning outcomes. This finding supports the pedagogical flexibility advocated by Vlachopoulos and Makri [1], who emphasized that games and simulations can be effectively integrated into traditional educational processes when properly structured.

5.4 Contribution of the study

While previous research has applied these frameworks independently, their synthesis creates comprehensive educational architecture specifically designed for experiential professional education through serious games. The Unified Model of Events Management [38] provides content structure - the "what" of event management (decision-making, planning, implementation, evaluation) - while the Scenario-Based Education Framework [45] provides pedagogical process -the "how" of structuring learning experiences. This integration addresses

a critical gap in serious games literature: the absence of theoretically grounded frameworks for transforming commercial games into structured educational tools.

This integrated framework advances serious games theory by connecting professional competency models with educational design principles. The scenario-based approach provides systematic scaffolding that guides students through increasingly complex tasks, addressing critiques that serious games often lack structured learning progression [33]. By mapping educational scenarios to specific learning objectives and assessment methods (Table 2), the framework ensures constructive alignment - a principle often violated in game-based learning where gameplay and assessment are disconnected. Furthermore, the framework explicitly theorizes the integration of virtual and real-world components, contributing to emerging literature on hybrid learning models that transcend simple online/offline dichotomies.

Compared to existing frameworks, this integrated approach offers greater specificity for sport management education than generic serious game frameworks [32], while providing more pedagogical structure than pure simulation models [31]. It represents middle-range theory - neither overly general nor narrowly context-specific - enabling adaptation across sport management domains beyond event management (e.g., facility management, sport marketing). The findings also support the growing body of evidence regarding serious games' effectiveness in higher education, aligning with Boyle et al.'s [33] findings on knowledge acquisition while extending this understanding to include practical skill development and experiential learning in specialized professional domains.

5.5 Limitations and future research directions

As mentioned earlier, several limitations must be acknowledged when interpreting these findings. The study employed a convenience sample from a single university department, limiting the generalizability of results to broader populations and educational contexts. The absence of a control group prevents direct comparison with traditional teaching methods and limits the establishment of causal relationships between the serious game intervention and learning outcomes. The data collection relied primarily on educational assessment methods rather than standardized instruments, which may affect the comparability of findings across different educational settings. Additionally, the study was conducted within a single cultural and educational context, which may limit its applicability to international educational environments. Future research should address these limitations through several approaches.

Randomized controlled trials comparing the hybrid serious game approach with traditional teaching methods would provide stronger evidence of educational effectiveness. Such studies should include appropriate control groups and utilize standardized assessment instruments to enable broader comparisons and meta-analyses.

Replication studies across multiple universities, countries, and cultural contexts would enhance the external validity of findings and provide insights into the cultural adaptability of the hybrid learning model. These studies should also examine the approach's effectiveness across different types of serious games and educational contexts.

Longitudinal studies examining the long-term retention of knowledge and skills acquired through the hybrid approach would provide valuable insights into the durability of learning outcomes. Such research should also investigate whether skills developed through serious game environments transfer effectively to real-world professional contexts. Pre and post-test evaluations of students' attitudes toward gamified education would provide insights into the motivational and engagement aspects of the hybrid approach. This research could also examine individual differences in learning preferences and their interaction with serious game-based educational methods.

Future research should investigate the optimal balance between virtual gameplay and real-world execution components in hybrid models. Our study combined both elements, but their relative contributions to learning outcomes remain unclear. Dismantling studies that

systematically vary the proportion of game-based vs. real-world activities would provide insights into cost-effectiveness and efficiency. Such research would also address the question of whether serious games are necessary for the learning outcomes observed, or whether the structured scenarios and authentic tasks would be equally effective without the gaming component – a critical question for evidence-based educational investment decisions.

6. Conclusions

This study advances serious games literature by demonstrating that pedagogical design - not game mechanics alone - may be a critical factor in determining educational effectiveness. The innovative synthesis of Salem *et al.*'s [38] Unified Model of Events Management with Misfeldt's [45] Scenario-Based Education Framework creates a theoretically grounded approach for transforming commercial games into structured educational tools. The Unified Model provides content architecture (decision-making, planning, implementation, evaluation), while the Scenario-Based Framework structures the learning process itself. This integration addresses a critical theoretical void in game-based learning environments and generates a middle-range theory adaptable across sport management domains. Empirically, the study validates that commercial games combined with structured curricula may produce measurable outcomes in both theoretical understanding and practical competence, offering an evidence-based alternative to traditional lecture-based instruction.

The study offers actionable implications for multiple stakeholders. For curriculum developers, it provides a replicable model with modular design adaptable to diverse institutional contexts. Faculty gain practical guidance for leveraging freely available commercial games without custom development costs. Students benefit from authentic experiences developing technical and soft skills, potentially democratizing practical competency regardless of prior experience. Institutions receive a validated approach for bridging the theory-practice gap while enhancing student engagement.

Future research should pursue four critical directions. First, randomized controlled trials comparing hybrid approaches with traditional methods using standardized instruments would establish causal relationships. Second, cross-cultural replication studies would examine framework adaptability across educational systems and contexts. Third, longitudinal studies tracking long-term retention and professional transfer of acquired competencies would validate durability of learning outcomes. Fourth, dismantling studies determining optimal balance between virtual gameplay and real-world execution components would clarify design parameters and cost-effectiveness.

This study provides preliminary evidence suggesting that commercial serious games, integrated within theoretically grounded frameworks, may help bridge the gap between theoretical knowledge and practical application in sport event management education. The framework synthesis advances both serious games scholarship and sport management pedagogy. While limitations necessitate future experimental research, findings establish preliminary evidence that hybrid serious game approaches represent a promising direction for experiential professional education, offering sport management programs a practical, theoretically sound pathway for curriculum innovation.

Based on the above, this study suggests that the serious game Top Eleven may serve as an auxiliary educational tool for acquiring both theoretical knowledge and practical experience in sport event management when implemented through a structured hybrid learning approach. The empirical evidence suggests that commercial serious games, when integrated with real-world execution components and guided by established educational frameworks, may constitute viable alternatives to traditional lecture-based instruction in professional education.

Abbreviations

NKUA	National and Kapodistrian University of Athens
SPESS	School of Physical Education and Sport Sciences
SG	Serious game
OC	Organizing Committee
PM	Project Manager
VIFT	Virtual Intramural Football Tournament

Conflicts of interest

The authors declare no conflicts of interest.

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