Gamifying IT Service Management Education for Future IT Professionals

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Gamifying IT Service Management Education for Future IT Professionals

Short Paper

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Abstract

IT Service Management (ITSM) education is nowadays an established subject of IT-related higher education programs worldwide. The recent years have witnessed significant developments in software and ITSM frameworks, which underscores the importance of adapting educational formats to meet the latest standards. Recent developments include the introduction of practice-oriented approaches and case-based learning. Building upon previous literature, this study describes and evaluates the first iteration of a teaching case integrating a simulation game for practicing ITIL® 4 foundations in an undergraduate ITSM curriculum. The game-based approach shows scalability and dynamism, fostering high student engagement and content comprehension. It represents a promising avenue for training IT workers and contributes to ongoing ITSM education development.

Keywords: Game-based learning, IT service management, IS education

Introduction

The widespread dependency on information technology (IT) and its continuous availability today underscores the ongoing two-decade-long discourse on professionalizing IT service delivery. As industry practices rapidly evolve, the significance of Information Technology Service Management (ITSM) knowledge is growing for the new generations entering the IT workforce. ITSM is defined as “a set of specialized organizational capabilities for enabling value for customers in the form of services” (Axelos, 2019, p. 6). Initially, ITSM focused on service delivery, enabled by a set of uniform processes such as incident management, change management, or problem management, and service support, along with increasing customer satisfaction (Galup et al., 2009). So-called “tickets” are commonly created within ITSM applications to document and handle incidents, service requests, and complaints, representing datasets that characterize the type of issue or request for resolution (Eckstein et al., 2016). Today, ITSM extends beyond IT functions, integrating process frameworks with governance, project management, systems development, and software engineering dimensions (Ramakrishnan et al., 2020). A global industry de facto standard example illustrating this framework-driven approach is the IT Infrastructure Library (ITIL®). The ITIL framework builds itself upon a set of industry publications and serves as “best-practice guidance for ITSM” (Axelos, 2019, p. 188). Its latest version, ITIL 4, has been released in 2019 and has become an industry standard in the field. Moreover, ITIL certifications are widely recognized as ITSM qualification testimonies.
Gamifying IT Service Management Education

Literature emphasizes the importance of integrating ITSM into IT-related education to bridge the business-technology gap (Bullen et al., 2009). Concomitantly, researchers recognize the need for IT managers and employees to adopt new behaviors (Korsaa et al., 2013; Trinidad et al., 2021). However, new industry-driven requirements often necessitate novel academic teaching methods enhancing the traditional learning to convey an understanding of real-world problems and demonstrate how to solve them, thereby effectively preparing graduates for the labor market. For this purpose, game-based learning approaches have been found beneficial, as they enhance student motivation and engagement, facilitate cognitive and emotional development, and contribute to overall learning efficiency and problem-solving skills development (Adipat et al., 2021; Anastasiadis et al., 2018; Pratama & Setyaningrum, 2018; Prensky, 2003). Furthermore, equipping students with technological expertise through gaming is said to enhance their readiness for future employment in a tech-driven professional landscape (Adipat et al., 2021). In the light of this motivation, previous research has come up with several game-based approaches in ITSM teaching, e.g. Cater-Steel et al. (2011) and Pröhl et al. (2013). However, the literature is rather scarce and the teaching cases showed a low degree of scalability in terms of students’ groups size and adaptability to diverse real-world IT environments and industries.

Approaching the task to implement game-based learning elements in ITSM teaching and contributing to prevalent knowledge and practice around ITSM education, this paper aims to answer the following research question (RQ): How can a game-based teaching case be effectively delivered that is scalable and adaptable to latest ITSM management and technology standards?

Background

With the rapid development of ITSM frameworks, such as Microsoft Operations Framework, IBM Tivoli Unified Process, and ITIL in the early 2000s, some universities became early adopters, incorporating ITSM as an educational course into their curricula (Cater-Steel et al., 2010). Since then, many more schools have integrated ITSM into their academic programs and several studies have been conducted, highlighting the importance of ITSM knowledge for graduates (Cater-Steel et al., 2010, 2011; Pröhl et al., 2013). ITSM education based on ITIL is particularly popular, as well as giving students the opportunity to obtain an ITSM certificate after successful course completion (Cater-Steel et al., 2010, 2011; Pröhl et al., 2013). Some papers describe the application of gamification methods in enterprises, mostly to increase motivation and performance of service desk employees at the workplace (Conger, 2016; da Conceicao et al., 2014; Yuan et al., 2015). Orta and Ruiz (2016) suggest improving ITSM through gamified simulations for IT managers (Orta & Ruiz, 2016). They assert that this approach enhances their motivation and has a positive impact on key performance indicators. Cater-Steel et al. (2011) implemented an ITSM simulation game that was reported to be resource- and time-consuming for the trainers, however, the student group interaction effectively led to learning effects (Cater-Steel et al., 2011). The case of two universities studied by Pröhl et al. (2013) also shows the use of a simulation game transferring theoretical knowledge to solve a real-world problem. Enriching theoretical input through practical exercises was considered essential according to the students’ feedback (Pröhl et al., 2013). The game included selected ITIL processes such as Incident Management, Problem Management, and Change Management. These IT support processes are gamified most frequently among existing ITSM case studies (Trinidad et al., 2021). The introduction of problem-based learning principles in another undergraduate ITSM course led to a better student performance in project results compared to traditional learning (Aničić & Mekovec, 2016). Most challenges identified in effectively teaching ITSM concepts primarily stem from the frequent updates to the frameworks, the extensive scope of their contents and a lack of engaging literature for knowledge transfer, avoiding overly theoretical course materials (Cater-Steel et al., 2010, 2011). ITIL, for instance, has been updated in 2000, 2007, 2011, and 2019, widening its scope with every new release. Additionally, translating theoretical knowledge into practical solutions for real-world business scenarios poses its own set of challenges (Pröhl et al., 2013). While using games as a teaching tool has been considered, they are seen as both resource- and time-intensive, and not easily scalable for larger student groups. Although software-based games may offer greater efficiency and require less tutor supervision for larger groups, they are not anticipated to yield the same learning outcome as those facilitated by direct group interaction (Cater-Steel et al., 2011).

Overall, previous research on gamified ITSM processes and ITSM in information systems (IS) education is rather scarce and the integration of gamification within the realm of ITSM is still in its initial phases, which requires engaging in extensive research within this domain (Trinidad et al., 2021). Furthermore, related
teaching cases in literature exhibit a notable age disparity, with ITSM software and associated frameworks, such as ITIL, having undergone significant evolution since most of the papers were introduced. On top of that, some authors have extensively documented experiences of teaching cases implementation and evaluation, however, there is a notable dearth of guidelines specifically tailored to the utilization of a game-based approach within the context of ITSM education. From the global software industry, in response to the growing demand for ITSM, a new generation of ITSM platforms has emerged, offering advanced solutions to meet evolving needs. Gartner’s Magic Quadrant report (Gartner, 2023) identifies ServiceNow, BMC, Atlassian, and Ivanti as four leading providers exemplifying consistent growth and offering most modern ITSM solutions. With the establishment of new standards in ITSM software, new knowledge and skill requirements emerge for future generations of IT managers. Hence, there is also an industry-driven need for academic ITSM education to adapt itself frequently to changes in technological and managerial best-practices, foremostly incorporated by popular frameworks such as ITIL.

Approach

In response to the RQ, this study employs an experimental approach integrating an ITIL-focused ITSM simulation game in a newly designed ITSM course for undergraduates. The first edition of the course has ended in January 2024, thus, this study reports early-stage insights with a small sample of five students. Since this experimental game implementation happened in a real course with real examination and grades, the lecturers prioritized the level of oversight and supervision quality promoted by a small group of students. The game uses Atlassian’s Jira Service Management software, allowing students to practically engage with an established and leading ITSM platform. Its content is focused on applying some of ITIL 4 practices. Hence, latest software and ITIL framework versions are utilized. This section explains how the game got embedded into an ITSM course for undergraduate students and elaborates on the design details.

Context

The ITSM course comprised seven sessions, each lasting six hours, conducted between October and December 2023 with the examination scheduled for January 2024. The course targets undergraduate students enrolled in the fifth semester of a Business Information Systems program. The course timeline is visualized in Figure 1 and the content is outlined in Table 1.

<table>
<thead>
<tr>
<th>Day</th>
<th>Focus of the paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seminaristic lecture: ITSM basics</td>
</tr>
<tr>
<td>2</td>
<td>Seminaristic lecture: ITIL 4 basics</td>
</tr>
<tr>
<td>3</td>
<td>Seminaristic lecture: ITIL 4 focus practices</td>
</tr>
<tr>
<td>4</td>
<td>Seminaristic lecture: ITSM Tools &amp; Introduction to the simulation game</td>
</tr>
<tr>
<td>5</td>
<td>Simulation game: service request &amp; incident management</td>
</tr>
<tr>
<td>6</td>
<td>Simulation game: incident &amp; problem management</td>
</tr>
<tr>
<td>7</td>
<td>Simulation game: Change management &amp; final report</td>
</tr>
<tr>
<td></td>
<td>Examination</td>
</tr>
</tbody>
</table>

Figure 1. ITSM course timeline

Table 1. ITSM course content outline

<table>
<thead>
<tr>
<th>Focus</th>
<th>ITIL 4 2019 Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning objectives</td>
<td>(1) Comprehensive understanding of ITSM in the context of increasing IT integration in businesses; (2) Exploring and comprehending ITSM frameworks (especially ITIL), processes, best practices, and tools; (3) Addressing challenges in ITSM and applying ITSM concepts in real-world scenarios; (4) Development of skills necessary for the efficient delivery of IT services.</td>
</tr>
<tr>
<td>Delivery mode</td>
<td>On-campus lectures; on-campus game-based exercise</td>
</tr>
<tr>
<td>Target group</td>
<td>Business information systems students; up to 8 students per supervisor/teacher</td>
</tr>
<tr>
<td>Course assessment</td>
<td>Final examination (90 min; multiple-choice test); oral presentation of game-based exercise outcome</td>
</tr>
<tr>
<td>Course duration</td>
<td>4 theory lectures, 3 days of game-based exercise, 1 examination day</td>
</tr>
</tbody>
</table>
Teaching Case Setup

Scholarly guidelines suggest that theoretical input, game, and teaching logic shall be aligned to achieve an effective balance between game engagement, learning, theoretical concept applicability as well as the incorporation of group and individual work and feedback sessions, all embedded in a case written to match overall course objectives (Farhoomand, 2004; Olejniczak, 2017). This section describes the case details.

Story

The story revolves around a fictional case company called “Global Food Ltd.”. Due to the rapid growth of this company, several challenges have emerged in the realm of ITSM. The existing systems and processes for incident, problem, as well as change management, and coordination of disruptions are no longer sufficient to meet the company's demands. In particular, the following issues have caused inefficient operations: manual capturing and tracking of incidents, lack of overview of incidents and bottlenecks, difficulties in cross-departmental collaboration, insufficient traceability of tasks, inaccurate data for internal reporting and external audits, lack of knowledge sharing within the company. Therefore, the company requires a robust ITSM solution to standardize incident management, service request management, problem management, change management, and knowledge management.

Roles

During the game, students act as ITSM specialists who need to assist in managing the ITSM demands of a fictional case company. The free version of the selected software allows to sign up three participants per group, representing three possible roles: IT manager, HR manager, and help-desk employee. Students can choose to take on multiple roles if necessary.

Tasks

The lecturer(s) interact with the students throughout the game, writing requests and reporting problems from the perspective of co-workers or customers. Thereby, tasks are assigned to students, mostly via e-mails, covering five selected ITIL practices: service request management, incident management, problem management, change management and knowledge management. Students are therefore required to create documented records on specific incidents, requests, problems, or changes within the IT system, further referred to as tickets. Each task focuses on a specific problem, though not all necessary information are provided in one message. Students can (and in some cases need to) reply to requesters to seek additional details about the individual issue. While initial request messages can be pre-written to save time on the lecturer's side, any reply from the student teams need to be processed manually to keep individual conversations going. Addressing customer-described issues, students need to identify problems, create action plans, and resolve tickets following ITIL 4 recommendations and personal judgement, and thoroughly document each step. The project documentation comprises status reports after the initial two gaming sessions, culminating in a final report after the third session, each complemented by subsequent feedback sessions.

Learning and Game Mechanisms

All exercise days follow the same structure. To amplify specific learning and game mechanics applied in each phase of the exercises, the approach proposed by Arnab et al. (2015) and exemplified by Abbott (2019) was followed as depicted by Figure 2.

Evaluation Strategy

Bas et al. (2020) derived three primary assessment categories for simulation games based on the existing literature: pre-game, in-game, and post-game (Bas et al., 2020). Their findings suggest the applicability of diverse methodologies throughout each of the phases. In the evaluation of the teaching case and students’ experience, we followed a similar strategy, with an emphasis on in-game and post-game assessment techniques. Classroom observation during gameplay is considered appropriate for obtaining a comprehensive overview of activities in the classroom setting (Tan et al., 2013). In-game discussions, wherein students’ questions were answered, and assistance was offered as required. Additionally, field
notes were taken during these classroom observations. Participants received timely informative feedback both during task completion and after the regular status presentations at the conclusion of each gaming session, which also served as a means for monitoring and tracking performance. The objective of the post-game evaluation was to gauge students’ perceived alterations in knowledge and skills. It encompassed task performance evaluations and questionnaires (Costantino et al., 2012). Previous authors claim that the evaluation of a simulation game should take the game’s overall quality into account (Faria et al., 2009). Several studies have outlined evaluation criteria for games in the field of computing education (Petri et al., 2017; Petri & Gresse von Wangenheim, 2016, 2019). The criteria and recommended questions were adapted to align with the context of business IS, culminating in the formulation of the questionnaire. Finally, 23 scaled questions were asked, each with a 5-point scale, addressing player experience, game design, and perceived learning. Additionally, three open-ended questions were included for optional responses, allowing students to express their preferences, areas of dissatisfaction, or suggestions for improvement in the game. Finally, a comprehensive written exam was developed with similarity to questions asked in an ITIL certification examination. The exam results serve as indicators for the overall student performance evaluation in the course.

Preliminary Results and Evaluation

Classroom Observation

On day 4, students are introduced to the software and are given the opportunity to familiarize themselves with its main functions through a demo project. Day 5 marks the start of the game, during which students are introduced to the case story and their roles. Following this, students work together in groups, log into Jira, and establish their project working space. After a few minutes, they receive first e-mailed requests from stakeholders and are supposed to react accordingly, that is, to create and resolve classified and assigned tickets. Figure 3 shows an overview of e-mailed requests to one of the groups. Each email is written in the form of a request or incident report. An exemplary email request looks as follows:

“Hello, I'm a bit embarrassed - but you need to reset my password. Unfortunately, I forgot it and I need admin rights for it. Username is MarkoTromm01022003. PC number is H54412 and the cable connection to the network is through socket 1132 in the Berlin warehouse. Best regards, Marko Tromm. Warehouse Management Berlin”

Some emailed requests report the same issue, as illustrated in the Figure 3, where multiple customers report a WiFi outage. In ITIL, a recurring incident is classified as a problem and should be handled differently from a regular incident, which implies the application of the problem management practice (Axelos, 2019). Students need to learn to identify such cases independently.

Figure 2. Gameplay process for each exercise day mapped with Game Mechanics and Learning Mechanics based on Arnab et al. (2015) and Abbot (2019)
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During the game, students communicated with the requesters, enacted by lecturer(s), to ask for more details or report on progress. The software allows to write internal notes to communicate within the group, which was actively used by the students. As the internal communication holds significant relevance in ITIL, for instance, in the guiding principle “think and work holistically”, an example of it is visualized in Figure 4. On exercise days, students effectively managed service requests, creating distinct incident, problem, and change tickets. They maintained active communication with external requesters. All issues were resolved successfully. For instance, a simulated phishing email was dispatched to the groups under the guise of a request. One group identified the email as a phishing attempt, while the other group clicked on the link provided, prompting them to review instructions regarding phishing mails. To handle the phishing attempt, students created an internal second-level ticket within the organization to adjust the company’s firewall settings and also push appropriate informative communication to the users. Another example scenario is the structured planning for a software vendor patch and the necessary update of systems, including an approval from the change advisory board (CAB). Therefore, the students’ task was to create and prioritize the ticket and document available information for the CAB request.

Performance and Feedback

A total of five questionnaires were filled in by the students following the conclusion of the last exercise day, forming the basis for subsequent analysis. Detailed examination of the responses reveals that all participants perceived the game scenario as highly realistic. Moreover, the answers indicate a favorable assessment of the challenging nature of the game. Regarding social interaction, all respondents successfully engaged in collaboration, with four out of five acknowledging the game’s capacity to foster cooperation and/or competition among players. Furthermore, three out of five participants expressed positive sentiments about interacting with fellow players, while the remaining individuals maintained a neutral
stance. Concerning the relevance of the game to the course, four out of five students affirmed a clear connection between the game’s content and the subject matter. Additionally, an equal proportion found the game to be an effective instructional method for the course. Most students called the game appropriately challenging, noting that it presented new challenges at a suitable pace. In terms of perceived learning outcomes, unanimous agreement was observed, as all students believed that the game significantly contributed to their understanding of the course material. Notably, two participants strongly agreed, while the remaining three agreed with this sentiment. Furthermore, all respondents asserted that their experience with the game would positively impact their professional performance in practice. Of these, one strongly agreed, and four expressed agreements. Regarding the efficiency of learning, most students opined that the game facilitated efficient learning compared to other course activities, with two strongly agreeing, two agreeing, and one maintaining a neutral stance. The feedback also indicates that the students faced challenges in the course, primarily centered around time constraints. Many expressed a need for more time to complete tasks, prepare reports, and finalize presentations. There was also a desire for varied tasks and group timings to enhance engagement. Interestingly, students felt they had "almost too much freedom" in the course, highlighting the delicate balance between autonomy and guidance in the learning process. Linguistic challenges arose due to the course’s use of two languages—English for ITSM and ITIL concepts and German as the instructional language. In the end, all course participants passed the examination, with correct answer percentages ranging from 50 to 90%.

**Conclusion and Next Steps**

Compared to previous approaches, the here introduced game-based approach in ITSM education is characterized by its scalability and dynamism, yielding an up-to-date addition to educational practices. This may become more and more important as IT workers face the need for reskilling in response to emerging trends such as generative AI (McKinsey & Company, 2023). So, scalability is achieved by the software-based simulation, enabling students to engage with a variety of tasks, while also requiring less supervision. For future courses, it is intended to use a paid version of the software to handle larger student groups. The ambition is to scale up to 30 students per class, allowing a more efficient use of lecturer resources. The adaptability shall be achieved upon aligning various incidents, occurrences and tickets according to industry-specific contexts. Classroom observations revealed a high level of student engagement, leading to substantial discussions aimed at understanding both content and the context. One student noted that the learning effect was enhanced by immersion effects in the simulation context and unexpected challenges within the tasks. The overall feedback aligns with previous literature, confirming the effectiveness of game-based approaches in ITSM education. Contrary to the assumptions of Cater-Steel et al. (2011), the software-based simulation was observed as supporting collaboration among students. Further exploration of collaborative activities and their impact on learning outcome is needed in future iterations with larger groups. The main limitation of this work is the small sample of participating students as a starting point. As this short paper represents an ongoing research, further evaluation and more robust theoretical contributions will be made with continuing course iterations. Building on results of this study, implementing game-based techniques to educate and train practitioners in ITSM processes, similar to the classroom approach, is feasible. This recommendation resonates with Trinidad et al. (2021), to increase the effectiveness of employees’ task performances. Also, the evaluation of specific game mechanics’ impact on learning and related factors is an area for potential enhancement that could provide valuable insights and serve as a foundation for interdisciplinary research. Students noted the need for clearer game rules and less gameplay freedom, which could enhance future learning experiences. Therefore, future work is encouraged in both classroom settings and practical applications as well as academic research on game-based learning.

**References**


