Game Facilitators in Higher Education: Analysis of Current Competencies and Their Potential Optimization

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Abstract

Background: Serious games are often said to be a powerful learning tool in higher education. The games used are often facilitated, and literature indicates that the success of the players' learning outcomes depends on the facilitators' competencies. Facilitators in most commercially offered game-based training have undergone specific instruction, but for facilitators in higher education, this is hardly documented. We therefore assume, that the latter is not the case.

Objective: This article presents a study addressing the actual competencies of occasional game facilitators and their possible perceived competency deficits.

Methods: As the authors have many years of experience as facilitators themselves, the authors defined requirements for the role of the occasional game facilitator. Based on these results, guided interviews with additional occasional game facilitators were conducted (N=4). Thereafter, an online questionnaire based on existing competency models, was answered by occasional game facilitators (N=30).

Results: The measurements primarily determine (i) Which competencies are particularly needed by the facilitator and what are training needs for the facilitator? (ii) What do current training courses for occasional game facilitators in higher education look like? (iii) How do the competencies of occasional game facilitators differ from other competencies?

Conclusions: The results show on the one hand the characteristics of the competences which game facilitators require and on the other hand a considerable demand for specific formal training. Thus, the study contributes to the further development of a competency model for game facilitators and consequently to the enhancement of serious games' efficiency.

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Game Facilitators in Higher Education: Analysis of Current Competencies and Their Potential Optimization

Abstract

Background: Serious games can be a powerful learning tool in higher education. But literature indicates that the learning outcome in a serious game depends on the facilitators' competencies. While professional facilitators in commercial game-based trainings have undergone specific instruction, facilitators in higher education cannot rely on such formal instruction. Game facilitation is only an occasional part of their teaching activities.
Objective: This article presents a study addressing the actual competencies of occasional game facilitators and the competency deficits they perceived.
Methods: The authors have many years of experience as professional and occasional facilitators. Hence, they (N=7) defined requirements for the occasional game facilitator using individual reflection and focus discussion. Based on these results, they conducted guided interviews with additional occasional game facilitators (N=4) to check and to extend the requirements. Finally, a group of occasional game facilitators (N=30) answered an online questionnaire based on the results of the requirement analysis and existing competency models.
Results: The measurements determine (i) Which competencies are needed by facilitators and what are their training needs? (ii) What do current training courses for occasional game facilitators in higher education look like? (iii) How do the competencies of occasional game facilitators differ from other competencies required in higher education?
Conclusions: The results show the competencies which game facilitators require and a demand for specific formal training. Thus, the study contributes to the further development of a competency model for game facilitators and enhances serious games' efficiency.

Keywords: facilitation; higher education; competency; simulation; gaming; educational games;

Introduction

Games in education offer alternative means to balance the learning of a subject, its retainment and application. Games used for a non-entertaining purpose are often termed 'serious games' [1–3]. However, there is also several other definitions and terms, like simulation games, educational games, or digital educational games [2], and can be single player or multi-player games. Furthermore, the usage in an educational setting differs, but within the engineering education these are often facilitated, and based on experiential learning models. For instance, it might be assumed that a gameplay cycle reflects the four phases of Kolb's experiential learning cycle [4]; a recursive cycle of experiencing, reflecting, thinking and acting to help learners increase their learning power.
Experiential learning, as well as gameplay, requires learners to take responsibility for their own learning. But teachers should not overestimate the students' level of achievement on conceptual understanding [5]. A particular experience by an individual is often idiosyncratic to their perception of that experience and outside the control of the teacher. This dichotomy could encourage staff to provide answers. But the key is to avoid answers and instead develop the learners' capability to find answers on their own [4, 6–8].
Purposeful learning processes based on serious games are often termed as game-based learning (GBL). The learning outcomes supported with GBL are diverse. For example, meta-skills are trained in simulation games [9, 10], affective learning outcomes are achieved [11], engagement of learner is

increased [12], system interdependencies are demonstrated [13, 14], and pure factual knowledge is taught [15, 16] all based on GBL. De Gloria et al. [17] distinguish between factual knowledge and skills as learning outcomes supported by GBL. Egenfeldt-Nielsen [18] discusses a wide range of GBL scenarios and the learning outcomes achieved. In a systematic review on the use of serious games, Boyle et al. [19] identify the categories of science, technology, engineering and maths (STEM), health, business and economics, and languages as domains for GBL. From the fundamental perspective of game studies, Klabbers [20] discusses the issues of knowledge building in games, while Shaffer coins the term epistemic games [21]. Games can be seen as environments in which experiences are gained, which are processed by the learners and thus lead to learning processes. The theory of situated learning [22] is one of the approaches to understanding the nature of GBL: games may be seen as a context in which experiences may be gained. Another approach is that of sensemaking [23]: the experiences generated by games must be interpreted and opened up by the learners themselves. Without emphasizing any of these and other approaches, it becomes obvious that GBL poses different demands on the teacher compared to traditional teaching concepts, such as traditional classroom settings. Accordingly, the role of a teacher in GBL must differ from that of a traditional classroom setting. Here, the teacher as a facilitator can improve the permeance of learning by activating the affordances of GBL. Chapman et al. [24] offer characteristics to define experiential learning through games. Of these the mixture of content and process (a balance between experiential activities and the underlying content or theory), the role of reflection (gaining insight into themselves and their interactions) and meaningful relationships (getting students to see their learning in the context of the entire world) have direct contextual alignment to GBL. If properly facilitated, it has potential for students to experience all four phases of Kolb's experiential learning cycle.

Facilitation should not be mistaken as a resource bank to help build students' confidence in the learning process. However, facilitators must set the right ambience where students feel engaged, valued, trusted, and respected [25]. They must create a space where students can express different viewpoints without fearing to say the wrong thing. And they need to be sensitive to cultural experiences, and to adapt the pace of learning, while ensuring the learners understand and absorb the subject [24]. Students need to understand why they are doing something, otherwise, they may not reach the intended cognitive and learning outcomes.

This paper asks where and what facilitation competency is necessary, then to what extent have competency models been applied or administered by those who engage or use games in education. It might be somewhere in between facilitating collaborative knowledge building and being aware of patterns in students' learning behavior (as an individual and in a group) towards problem-solving. In order to better understand this relation, the mode of research could be reshaped to question the role of reflection with respect to the content through a facilitator's ability to (i) recognize students' knowledge acquisition under guided and unguided independent learning, (ii) apply knowledge building mechanisms into the game-based learning process, and (iii) differentiate between game-based learning and gamified learning, and other blended learning (including conventional) approached. The overarching research questions a fascinator's familiarity with competency models in game-based learning and whether that has any impact on pedagogy.

Consequently, an attempt is made to assimilate the external and internal factors that are relevant to game-based learning, such as the experience of the facilitator, the types of games used, the structure of the course, the level and size of cohorts, the equipment/technology and the environment. The autoethnography approach taken draws from the authors' experiences along with an advocacy/participatory approach to understand and acquire new knowledge regarding facilitating game-based learning; the primary purpose to impart practical actions for future course design. A quantitative analysis follows to identify facilitator roles and to describe characteristics of facilitation (including models) that may be associated with successful game-based learning.

This section reviews and draws some insights into competency models for facilitators before conducting a self-observation and reflexive investigation on facilitating game-based learning. Results

of the qualitative and quantitative analysis are presented and discussed before concluding with some remarks on the facilitation process and associated competency models for game-learning.

Methods

The study attempts to assimilate the external and internal factors that apply to game facilitation, such as the experience of the facilitator, the types of games used, the structure of the course, the level and size of cohorts, the equipment used and the environment. In an autoethnographic and participatory approach the study drawn from the authors' experiences to understand and acquire new knowledge on facilitating GBL; the primary purpose to impart practical actions for future course design. A quantitative analysis followed to identify facilitator roles and to describe characteristics of facilitation (including models) that may be associated with successful GBL. The research questions to be answered were:

(i) Which competencies are particularly needed by facilitators, and what are training needs for facilitators?
(ii) What do current training courses for occasional game facilitators in higher education look like?
(iii) How do the competencies of occasional game facilitators differ from other competencies required in higher education?

The study offers perspectives into competency models for facilitators from literature (subsection *Literature review*). It then conducted a self-observation and reflexive investigation on facilitating GBL by the authors (N=7, subsection *Authors' experience review*). The results were complemented by guided interviews with game facilitators from the field of engineering education (N=4, subsection *External experience review*). The outcomes were compiled into a questionnaire with closed and open questions. The closed questions included an assessment of existing competency models for game facilitation-related activities. The questions determined the degree to which the competencies included in the models were considered important for game facilitation as well. Open questions aimed at contributing to a supplementation of the competency models. The questionnaire was distributed via social media. The qualitative and quantitative analyses of the answers (N=30) are presented (subsection *Questionnaire*) and discussed (section *Discussion*) in this paper. The paper concludes with remarks on the facilitation process and associated competency models for GBL (section *Summary and future work*).

Results

Findings from literature review

Competencies and their models have superseded the long-established job analysis and their resulting task descriptions in human resource management. For today's fast-changing world and its complex situations, job analysis turned out as an inefficient methodology [26]. Competency models define a structured collection of competencies that organizations can align to their objectives and strategies [27]. They support organizations to handle today's and future situations [28] and *"are used to hire, train, evaluate and promote employees on the same attributes"* [27]. The primary perception of competency as the ability to deal with typical situations (e.g. [29]) has meanwhile grown to the ability to deal with complex situations [28, 30]. Boulter et al. [31], cited in [32], suggested a process of six stages to define competency models (*defining performance criteria*, *choosing a sample of people*, *collecting data*, *analyzing the data*, *validating the found results*, *applying the model in practice*).

From the rising complexity of situations and problems, the role of the facilitator emerged to support organizations in the process of transition and transformation [33]. While expert consultants diagnose

problems and prescribe a therapy, facilitators are process consultants. They release the resources of a group to diagnose and intervene themselves, instead of focusing on the group's output [34]. Thus they improve a group's effectiveness [35]. *"The facilitator supports and guides, reassures and encourages […] and never 'teaches' the meaning of what is happening."* [25].

Nelson & McFadzean [34] developed a conceptual competency model for facilitators and defined seven areas of competencies: *understanding context*, *technical*, *rational*, *interpersonal*, *task process* and *human process competencies* and *other personal characteristics*. These competencies they differentiate within three levels, ranging from an initial to an expert facilitator. Stewart [33] generated a facilitator competency model from a qualitative study of groups in facilitation contexts and validated it through a survey. It comprises five areas of competencies: *interpersonal competency* (as *communication* and *further skills*), *management process competency*, *knowledge competency* and *personal characteristics*.

In higher education, the role of a facilitator is just one role of several alternatives for teaching. In a literature review, Hoidn & Kärkkäinen [36] summarize instructional effectiveness and process-outcome research on competencies for effective higher education teaching. They conclude that effective teachers start their series of lessons with direct instruction and decrease control with the growing mastery of the students *"to allow for independent and fluent performance by the students themselves"* (p.35). However, they conclude that an ultimate consensus on effective teaching is difficult because of the manifold contexts of teaching. They identify enthusiasm as a key element of instructional effectiveness. Blašková et al. [37] propose a competency model for university teachers based on theoretical analysis and a survey among students. The competency model they propose comprises professional, educational, motivational, communicational, personal, science and research and publication competency. Each competency they connect to indicators of positive and negative behavior. Both Blašková et al. [37] and Hoidn & Kärkkäinen [36] emphasize the role of motivational competency.

Similar to the range between controlled lessons and independent performance of students, Leigh & Spindler [25] adopted the idea of *closed* and *open games* to develop competencies of simulation and game facilitators. The facilitators' competencies range according to their degree of emotional detachment and the number of possible learning goals they allow. Leigh & Spindler [25] also see the facilitators' preference on open or closed games because of learning preferences and personality type. Kortmann & Peters [38] propose a competency model for game facilitation, singling out the differences between facilitating a simulation game and generic groups. They point out that the facilitation of games should require more competencies, as games can serve more aims. By interviews with a group of facilitation experts, they validated the model. But the authors express concerns that competencies at a sub-conscious level may have been missed.

Kortmann & Peters [38] identified similar competencies between facilitating game and generic group sessions, but they also point out dissimilarities resulting in extended competencies. Participants of games play within a model that requires additional abilities from the game facilitators. Game facilitators have to be aware that games are a means of learning about a real-life situation. Game facilitators need to switch and adapt quickly to different roles and styles during gameplay. To facilitate a session and delegate control to the game environment, they have to comprehend the game as an immersive instrument and understand its elements and mechanics. Finally, facilitators have to translate between the game environment and reality so that the participants transfer their experiences to the real world and back [38].

Authors' experience review

This section synthesizes the experiences of the seven authors as game facilitators. The authors reflected individually and independently upon a set of questions organised in three blocks: 1) experience with game facilitation, 2) knowledge on competency models, 3) required competencies and the biggest gap they perceived between required and present competency.

The following information was collected to understand the authors' experience with game facilitation:

- Types of games used
- Number of games used
- Description of the educational settings for using the games
- Reasons for using games in teaching
- Changes in the authors' perspective towards teaching
- Changes of one's own attitudes towards teaching
- Changes over time in the facilitation
- If the authors apply GBL in different settings

The analysis shows that the group has extensive experience with facilitation. All but one has facilitated several games, a few for decades, but all for at least four years. Most of the authors have facilitated games within engineering or management studies, at undergraduate and postgraduate level. Both fields have a strong tradition of using experiential learning [39, 40]. In addition, five have also facilitated games on executive and vocational level.

A large variety of games has been used by the authors. They have designed and developed games and used games developed by others. The games comprise multi-player games, and both board or haptic games and digital games. The topics addressed in the games can be divided into managerial competency development and engineering topics like bridge construction, sustainable manufacturing, and product development. Specific games addressing well-known problems like Bullwhip effect and Capacity constraints (i.e., where the player learns about consequences of a decision and strategies for solving a problem) were applied, and games addressing communication, cooperation and team skills. A difference appears between master courses and bachelor courses. At the undergraduate level the focus is on factual and procedural knowledge reflection. At master level it is on developing new knowledge and higher-order thinking. This is in line with how universities structure their undergraduate and postgraduate studies and with current taxonomies of learning objectives [41].

Although the authors have many years of experience in facilitating games, few have had any formal pedagogical background when they started their careers as game facilitators. None of them could be classified as a professional facilitator. Even if they facilitated regularly, it was never the primary task of their work obligations. Only one had game facilitation and GBL as a formal part of previous education at master level. A few had aspects of GBL as a part of their PhD studies.

The authors were expected to be familiar with competency models – either explicitly or implicitly; information collected was from a general, a teaching, and a facilitation perspective. They were also asked whether they had ever missed a formal competency model during their game facilitation activities.

The authors' overall knowledge about competency models is inhomogeneous; three neither knew nor missed any. Four had a general understanding and awareness of competency models. Various competency models were listed. But all were more relevant for higher education and vocational training [42–45]. One author pointed out that most studies on facilitation only cover small groups (less than 100 participants). The authors did not specifically miss a formal competency model. Except of two persons, they never felt a need for a formal competency model. All agreed that a formal competency model might be useful when changing and adapting guidelines for game facilitation. Two authors commented that facilitation of highly customized and user-specific games is not supported by existing competency models. The collected data indicates that the roles of the facilitator change depending on whether the facilitator handles the whole teaching unit or only cares for the game facilitation.

Regarding which competencies the authors felt required, two further questions were asked:

- Which competencies are important for the successful use of games from your point of view?
- For which competencies do you see the biggest discrepancies between requirements and actual competencies? Where is a need for training?

Most of the authors explained they had little pedagogical knowledge when they started facilitating games (and teaching in general), and three out of seven stated they did not know about competency models. But none severely missed them. Their general consensus was to have competencies in:

- Active listening as well as reactive and proactive abilities to act on group reactions using strategies like team management, participation techniques, consensus techniques, community management empathy, conflict resolution, and flexibility.
- Capability to assess pure facilitation techniques and to integrate experiential learning principles, moderation, mentoring and instructional capabilities under GBL settings.
- Understanding of the toolsets that can be implemented.

This also leads to challenges the authors identified:

- Digital skills
- Leadership capabilities
- Cognitive science
- Motivational skills

A major issue they discussed, was the preference of a facilitator to ask closed questions. In higher education it is important to have participants to synthesize and create new knowledge. Many students lack this ability; however, the games are often designed for this purpose. Facilitators need to draw up their register to foster this process. Regarding the facilitation of large groups, there are many digital tools that can support such facilitation. One hypothesis is that increased digital competencies among teachers and students could ease the usage of such tools. As this has to be considered as a relevant topic, more information on tools and methods can be found in Multimedia Appendix A.

The collective experience of the authors is, as stated earlier, in engineering and management in higher education, mostly at the university level. This is limited when analyzing the overall field of facilitation in higher education. Hence, additional data was collected from a wider audience through structured interviews (Section 4) and an online survey (Section 5).

External experience review

This section analyses the experiences of four interviewees. The results were compared to the results of the author group (using the same questions) and the survey outcome. The four participants teach at different faculties, but all within engineering. Their experience on game facilitation varies between 3 to over 10 years. All were using one game in which they were heavily involved in the development process. This differs from the authors' group that also had used Commercial Off-the-Shelf (COTS) games. The topics taught were urban mobility planning, traffic simulation, health care logistics, and games for ideation and innovation.

One facilitator used the same game twice in a course. The game was integrated into an existing curriculum and used at the beginning and at the end of the course in a workshop setting with bachelor and master students, so that the students could experience the learning progress throughout the course. Another facilitator used the same game throughout the semester with engineering students at master level, deployed through a blended learning environment. The curriculum was based on (and constructed around) the game scenarios. The third facilitator has used the game in around 25 sessions. It is embedded in a course, similar to the first author and played in one room with a physical and a digital component. The fourth facilitator used a game in a workshop setting (half-day) for bachelor students in civil engineering. It was a blended learning concept (as in the second case), comprising briefing, playing and lecture. In all four cases, the usage of games was initiated because of research activities and all chairs had a long tradition of GBL. All four facilitators have years of experience in facilitating games. They agree that games can be motivating and deliver a different

way of teaching. One emphasizes its interaction and the active learning activities.
Regarding the perspective on facilitation, the two with longer experience explain more and pay more attention to the introductory setting than the ones with less experience. One reports that the game can lead to frustration, but also to high engagement. Their knowledge about competency models is limited. Two have no knowledge, one has a generic understanding, and one knows different competency models, but unrelated to teaching. None has ever used a competency model for facilitation. However, three stated to have overlooked or at least missed it. Before gathering their own experience with game facilitation, they would have liked to be more aware of:

- Connection between game design and facilitation process
- How to observe and what to observe
- How to assess and conclude the game process
- How to know what aspects or knowledge needs to be assessed
- How to understand the players' game decisions and 'soft data' as behavior of players, level of communication with others etc.
- Observation and feedback

The final interview questions focused on the competencies the interviewees felt required and on the gap. All interviewees mentioned the importance of knowing the subject, the tools used and the technical environment as required competencies. One pointed out that it is imperative to also understand the methods behind GBL, that connecting gameplay and intended learning outcome is a key success factor. Two of the interviewees mentioned the need of motivational competency. Three saw the necessity for a facilitator to integrate the game in a larger context from a didactical perspective. One interviewee mentioned the ability to respect and regard the competency of the students.
The answers on the gap reflects the lack of formal pedagogical courses on game didactics and how to integrate games into the curriculum. The interviewees also saw a gap in how to facilitate groups of extreme sizes (i.e., less than 4 or over 100) and how to deal with a group's inhomogeneity in relation with the game runtime and different levels of knowledge. Further, one interviewee mentioned a gap in methods for nurturing the reflection competency among the students during the game session and in the debriefing phase.
The results of the qualitatively analysis indicate a large inhomogeneity related to facilitation and on the perception of required competencies. In order to get quantifiable data and a broader data source, an online survey was designed.

Questionnaire

This section describes the development of the questionnaire and its results. The questionnaire supplemented and refined the qualitative data with quantitative data on facilitation and competencies. The questionnaire was drafted in a team of three authors. It was followed by a pre-test and a subsequent discussion of all authors to validate it. The questionnaire comprised five parts: (1) demographic data, (2) general questions on game facilitation, (3) questions on the most challenging game facilitation, (4) a section on the importance of a competency model and (5) personal training received. The questionnaire concluded with an open question to comment on any other important topic.
The questionnaire was distributed via social media in the authors' personal networks and professional communities between June 1st and June 14th, 2020. 30 subjects took part in the survey. In the remainder of this section, the results specifically relevant for facilitating are described. Further results are included in Multimedia Appendix B.

Demographics

The participants' teaching experience in higher education range from 2-30 years, with an average of 12.5 years (SD=7.02). There is an average of 9.3 years of game facilitation experience (SD=6.73),

whereby the range spans from 1 to 30 years. In addition, the participants state that they have facilitated an average of 12.2 (SD=20.32) games. Here, the span was wide, ranging from 1 to 100, with one value (999) being considered an outlier. In the following Figure 2 and 4, the percentages refer to the respective share of participants. Since most participants have facilitated more than one game, this percentage differs from the percentage of educational scenarios. When asked about their positions, professors and senior lecturers account for the largest group (37%). Other senior academics and academics are represented with 23% each. 13% of the participants are PhD students. The remaining 3% are members of the group *Other.*

When asked about the rationale for the use of games, allowing multiple selections, 88% of participants indicated their personal initiative. 67% of the participants pointed out that a game fits best to the intended learning outcomes. 57% of the participants used games to contribute to multi-faceted teaching methods. The reason that the game is available at the respective institution is mentioned by 30% of the participants. Only 13% of the participants used games because games were part of the curriculum. Overall, it can be stated that the use of games in higher education is less systematically anchored but used because of the personal initiative of the lecturers.

Game facilitation comprises various roles. Thus, the participants were asked to rank six pre-defined roles taken during facilitation. For determining the statistical parameters, non-ranked roles were given the value 7. Figure 1 shows that the role of the facilitator (average rank: 2.3) and the role of the moderator (2.6) are considered the most important. The role of the instructor at rank 3 (3.6) is followed by the mentor role (4.1). The presenter role (4.8) and the referee role (4.9) occupy the last two ranks. Overall, the results show a coherent picture of the importance of the different roles of a game facilitator.

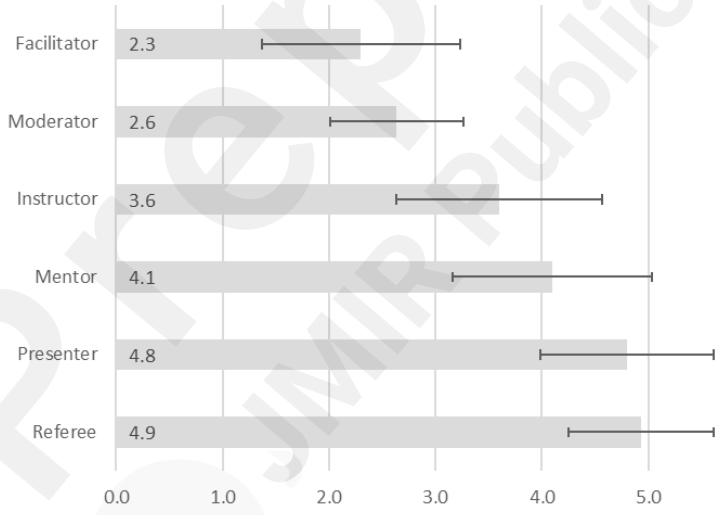

Figure 1 Ranked roles in game facilitating (7-point Likert scale, N=30)

Figure 2 shows the distribution of what type of games participants have facilitated.

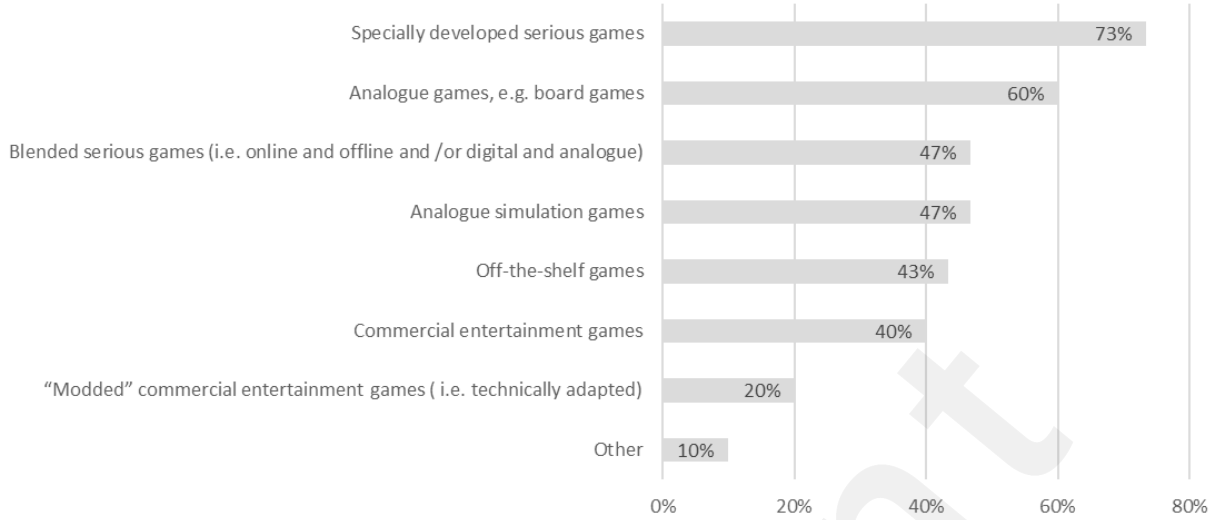

Figure 2 Game types facilitated (multiple selections per respondent, N=30)

Challenges in game facilitation

With an open-ended question, the participants were requested to describe their most challenging game facilitation and to specify the challenges they faced. Using theme analysis, 32 challenges were identified from 18 of the answers. With each challenge being unique, they are instead clustered into groups based on common themes and shared characteristics. For example, some participants mentioned that players do not have sufficient knowledge or that players cheat. While both examples are different, they still describe the characteristics or behavior of players. Hence, to ease understanding of all challenges in game facilitation, they were grouped in six clusters: Challenges related to (1) individual players and their actions, (2) technical aspects of using games, (3) class and collective aspects of players, (4) learning aspects of games, (5) games themselves, and (6) facilitators. Figure 3 shows these groups and challenges. The inner circle shows the clustered challenges and the outer circle the challenges themselves.

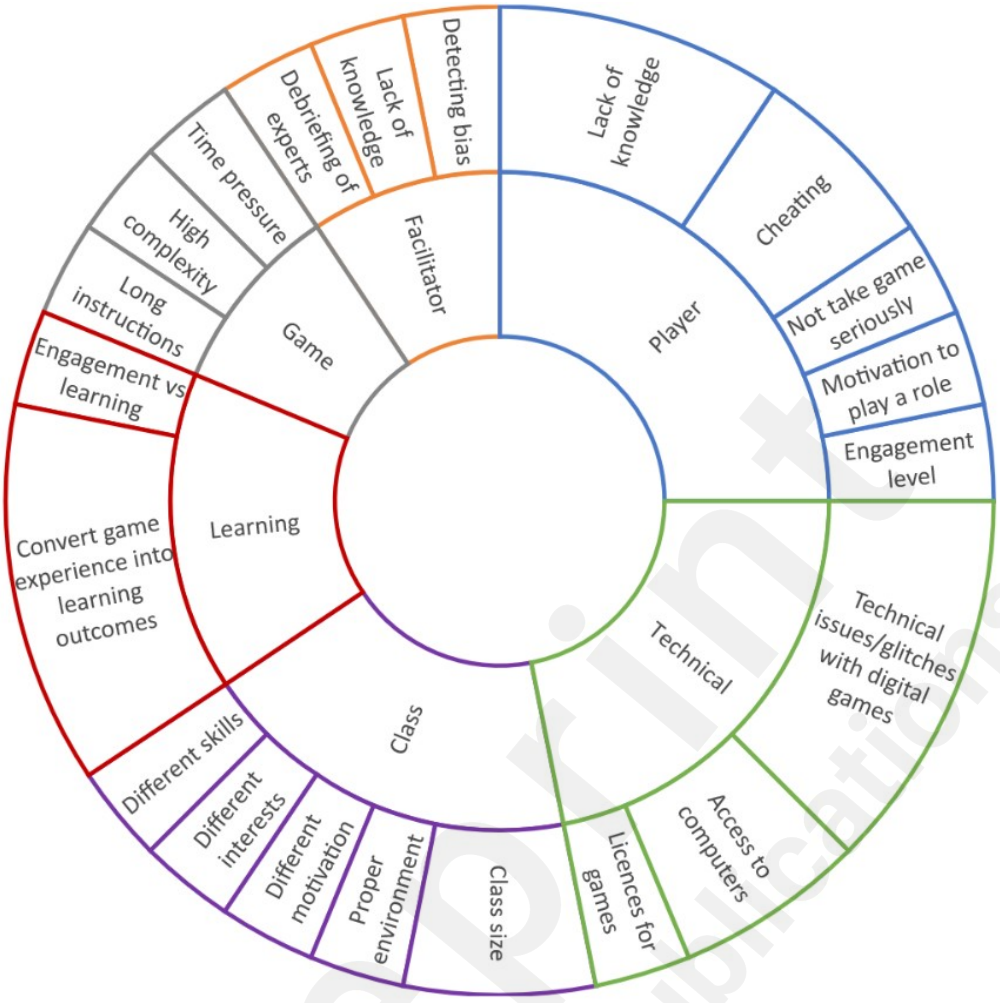

Figure 3 Challenges in game facilitation (open-ended question, N=18)

Challenges related to players include lack of knowledge to make all required decisions in a game. An example here might be a game for urban planning where students lack knowledge associated to economic aspects related to planning decisions. Furthermore, some students may not take a game as a serious pedagogical tool. Convincing students to engage in game activities is challenging notwithstanding the circumstances when students do not fulfil their role in the game.

Some challenges are technical in the context of digital games. Issues with software, device compatibility, to bugs or glitches in the game itself is highly disruptive. Another challenge is accessibility to computers or the internet to take part in a game.

Cohort sizes cause additional challenges on implementing games for learning, as discussed before and in Multimedia Appendix A. A further challenge is maintaining motivation for all players by ensuring the right environment during the entire game process. Inhomogeneous groups, in terms of skills, interests and motivation can also be a challenge to the game facilitator.

Since the purpose of games for learning is to ensure certain learning outcomes, converting the experiences of playing a game into such outcomes remains a major challenge. A concern mentioned by participants is that many students do not recognize the link between games and the subject of the overall program. Therefore, finding a proper balance between engagement and learning is a necessity. Immersion is important, but too high a level may hinder the learning effects.

Challenges related to gameplay implicates learning. The learning curve with respect to its usage and interaction can add additional complexity into a game learning experience. However, over-simplified games may be boring and insufficient to reach learning outcomes while over-complicated games may be too hard, not engaging and may distract from intended learning outcomes.

Finally, some challenges are related to facilitators themselves. Situations where a facilitator does not detect cognitive biases in individual and collaborative activities would consequently lead to an incorrect assessment of the game experience. Facilitating a game where experts are present can be a challenge too, because of the demand to define the problem and solutions. The latter challenges relate directly to game facilitation and reflect the competencies required of game facilitators. The challenges in the other categories in Figure 3 is less required according to Table 1. by game facilitators during game facilitation. Many of the challenges are not relevant during the facilitation itself, but especially when preparing the GBL activity and the infrastructure required. Thus, further expertise might be required. For example, technical problems such as licenses or access to computers, or when game-related challenges such as high complexity or long instructions is required. Overall, the challenges outlined above suggest that successful use of GBL depends on good game facilitation, but also on many other aspects. The following section examines what training game facilitators receive to master these challenges.

Facilitation training

The participants surveyed were also asked about facilitation training underwent(Figure 4). 87% selected “Learning by doing”, which cannot be considered structured training, nor one of the following two (“Co-facilitating with colleagues”, 57% and “Work shadowing with colleagues”, 47%). Only a third of the participants was classes as receiving formal training ("Formal course in university pedagogy"). “Supervision by experienced colleagues” was mentioned by only a quarter of the participants, as with supplier-specific trainings only playing a minor role. Overall, the share of formal training is rather low. This low rate of formal training may reflect the overall low rate of structured pedagogical training in university teaching.

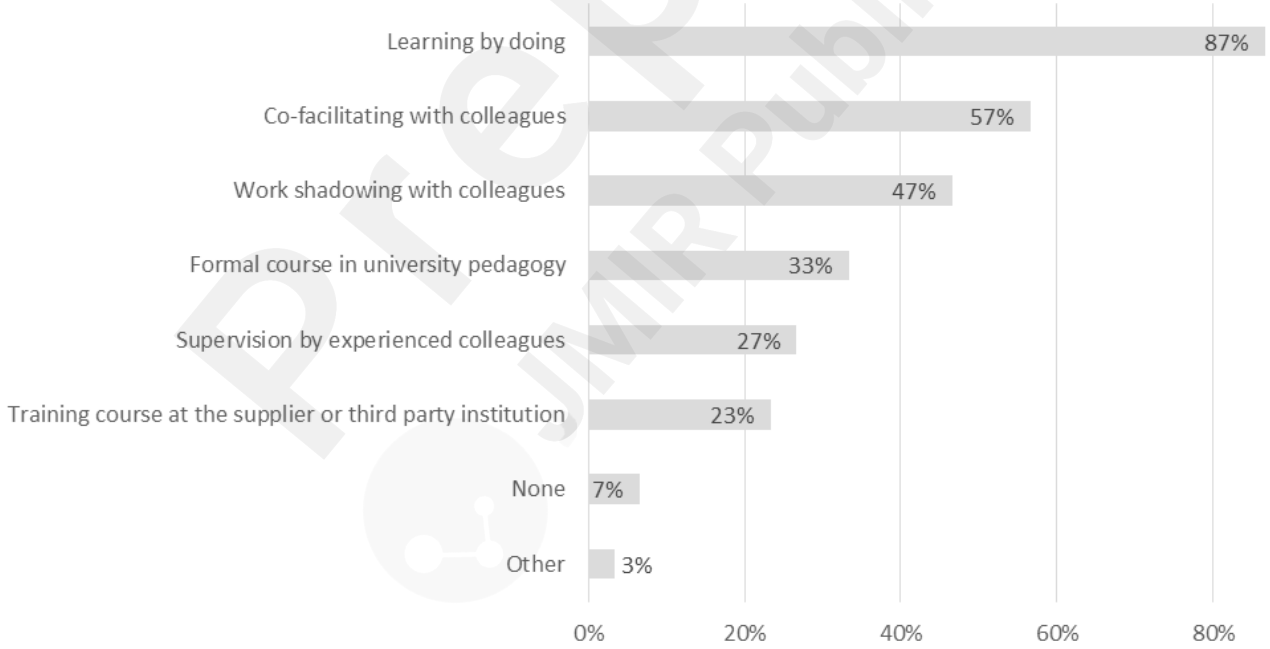

Figure 4 Types of trainings received (multiple selections per respondent, N=30)

The taxonomy of Heron (1999) was used to determine the extent to which training was helpful. Six dimensions of facilitation were defined in this taxonomy. On a 7-point Likert scale, participants were asked to rate for each dimension the degree to which the training received supported the respective dimension of facilitation (Figure 5). At the top of the scale with a value of 6.0 points was the dimension "Meaning", on which – deriving from the low standard deviation – the participants largely agreed. The other dimensions with similarly high scores but increased standard deviations were

"Planning" (5.8), "Valuing" (5.7), and "Structuring" (5.6). The dimensions "Confronting" and "Valuing" were rated on average one point (4.6) lower.
In summary, the high scores for all dimensions indicate that training was generally perceived as helpful. It remains to be clarified whether this assessment is because of the comparatively low amount of formal training, or whether the quality of facilitation might be strengthened by further targeted training.

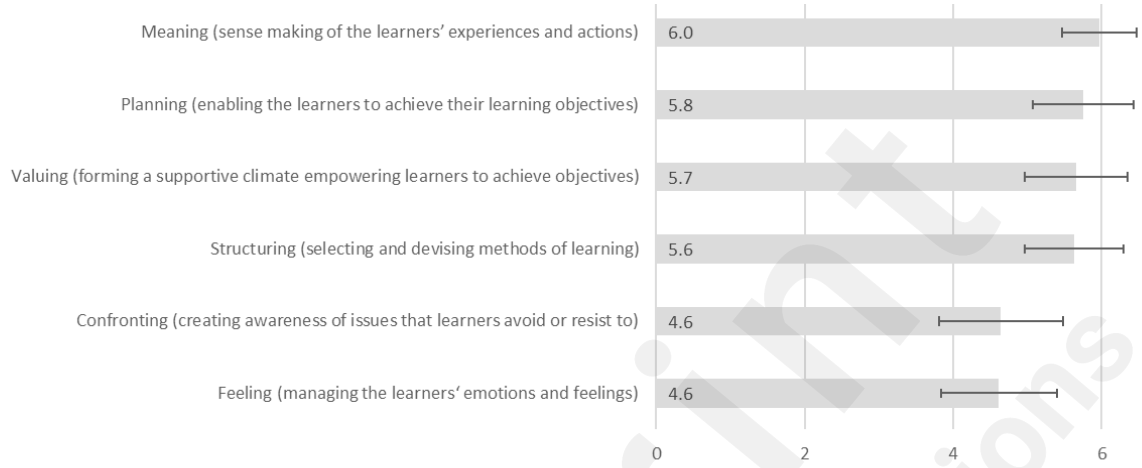

Figure 5 Helpfulness of trainings for categories according to Heron (1999)
(7-point Likert scale, N=27)

Competency model

Stewart's [33] competency model for group facilitators comprises 41 competencies categorized in five groups. The competence model was selected because group facilitation is usually included in game facilitation. Thus, Stewart's model represents a valid initial foundation for further tailoring to game facilitation processes, as also concluded by Kortmann and Peters [38]. The participants were asked to rate the importance of each of the competencies for game facilitators on 5-point Likert scales (Table 1). Almost without exception, game facilitator competencies receive lower scores for the importance of each competency, which is discussed in Section 6.
Table 2 lists all competency group scores of the participants surveyed. The difference of 0.7 points for the group of communication skills -the most important competency group for group facilitation -is striking. For game facilitation covered by this study, all scores are in the close range of 3.9 to 4.0 and below the scores for group facilitation investigated by Stewart [33]. Potentially, games being in the focus of GBL activities act as compensating media, which require less competence from game facilitators than it is necessary for group facilitators.

Table 1. Prioritization of competencies (5-point Likert scale, N=30)

Competency group	Competency	Mean (Stewart 2006)	Mean	Difference
Interpersonal competencies (communication skills)	Verbal	4.9	4.5	-0.4
	Non-verbal	4.6	3.4	-1.2
	Written	4.2	3.2	-1.0
	Questioning	4.8	4.2	-0.6
	Active listening	4.8	4.2	-0.6
	Perceptive listening	4.6	4.1	-0.5
	Empathy	4.3	4.1	-0.2
	Summarizing/paraphrasing	4.6	3.9	-0.7

	Sensitivity to group	4.6	4.3	-0.3
Interpersonal competencies (further skills)	Sensitivity to underlying emotions	4.5	3.9	-0.6
	Culturally awareness	4.5	3.8	-0.7
	Encourage participation	4.4	4.3	-0.1
	Negotiating	4.5	3.5	-1.0
	Flexibility	4.8	4.3	-0.5
	Recognize conflict	4.5	4.0	-0.5
	Resolve conflict	4.3	3.7	-0.6
	Transform conflict	4.2	3.6	-0.6
	Leadership	4.1	3.7	-0.4
	Motivate others to achieve goals	**4.0**	**4.1**	**0.1**
	Motivate others to participate creatively	**4.2**	**4.4**	**0.2**
	Recognize/reward achievement	**3.5**	**4.1**	**0.6**
	Model neutrality	4.6	3.8	-0.8
	Build relationships	4.3	3.9	-0.4
Management process competencies	**Planning/organizing**	**4.4**	**4.5**	**0.1**
	Managing time	4.5	4.3	-0.2
	Manage audio-visual aids	4.4	3.5	-0.9
	Manage physical environment	4.4	3.4	-1.0
	Assimilate information	4.1	3.8	-0.3
	Coaching others	**3.8**	**3.9**	**0.1**
	Manage feedback	4.4	4.3	-0.1
	Manage contract	4.1	3.2	-0.9
Understanding context competencies	Understand organizational context	4.4	4.0	-0.4
	Knowledge of theory and application of group facilitation	4.1	3.9	-0.2
Personal characteristics	Adaptability	4.7	4.6	-0.1
	Intellectual agility	4.5	4.3	-0.2
	Trustworthiness	4.6	4.1	-0.5
	Results motivation	4.3	3.7	-0.6
	Objectivity	4.5	3.9	-0.6
	Emotionally resilient	4.7	3.9	-0.8
	Self-awareness	4.6	3.9	-0.7
	Self-development	4.3	3.8	-0.5

On average, the competencies of Stewart's model [33] received for game facilitation scored 0.5 points lower compared to group facilitation. To determine which competencies are important for game facilitation compared to group facilitation, only competencies which scored higher for game facilitation over group facilitation was selected (Table 1, bold font). The most significant was the competence "Recognize/reward achievement" with a difference of 0.6, indicating a typical characteristic of games: recognition and rewards. In second with a difference of 0.2 was "Motivate others to take part creatively", which is associated with games where motivation played a prominent role. Competencies with a difference of 0.1 include "Motivate others to achieve goals. Finally,

"Coaching others" and "Planning/organizing" were considered by the respondents more important for game facilitation over group facilitation.

Table 2. Difference of prioritization compared to Stewart [33] per competency group

Competency group	M (Stewart 2006)	M	Difference
Interpersonal competencies (communication skills)	4.6	3.9	-0.7
Interpersonal competencies (further skills)	4.2	3.9	-0.2
Management process competencies	4.3	3.9	-0.4
Understanding context competencies	4.3	4.0	-0.3
Personal characteristics	4.5	4.0	-0.5

Discussion

During the last decades, there has been a shift from teacher-centric towards learner-centric learning models [47], which also nurtured the uptake of experiential learning, including GBL. This shift also affects the teacher's role. But how has this change influenced the teacher's competencies regarding facilitation within higher education? Teachers within higher education do often lack the formal didactical education that teachers within the K12 system have. In this article, therefore the following three research questions have been investigated:

i. Which competencies are particularly needed by the facilitator, and what are training needs for the facilitator?

Core competencies according to the interviews and authors' reflection were divided into two major groups: managerial and technical competencies. The more technical competencies comprise topics such as the knowledge of the gameplay, game content, its connection to the intended learning outcome and the operation of any technical infrastructure. The more managerial competencies include active listening and reactive and proactive abilities to act on groups reactions, through the use of strategies like team management, leadership, motivational and participation techniques, consensus techniques, community management empathy, conflict resolution, and flexibility. This is underpinned by the survey (Table 1), prioritizing the competencies according to Stewart [33], where verbal communication achieves 4.5 (out of 5), motivate others to take part creatively (4.4), flexibility and encourage participation (all interpersonal competencies) both ranked with 4.3. The personal characteristics adaptability and intellectual agility score 4.6 and 4.3. Competencies like planning and organizing (4.5), managing time and feedback (both 4.3) are also seen as core competencies, which is in line with the qualitative results.

The second part of this research questioned the need for training. The answer to this was complicated by the low proportion of people who received training (formal and informal). Among the interviewees, none had formal didactical training. This holds for 2/3 of the survey group, while the authors seem to have a higher percentage of formal courses. This might be because more than half of the authors hold faculty positions with requirements on didactics for higher education. The qualitative results clearly state the need for training in the connection of the didactics and gameplay from a different perspective.

The actual training in the area is for all low, which can be seen also in the wish list of the interviewees on addressed training topics before first facilitation:

I. Connection between game design and facilitation process (Heron: Meaning)
II. How to observe and what to observe (Heron: Meaning)
III. How to assess and conclude the game process. How to know what aspects of knowledge need to be assessed. (Heron: Planning and Structuring)
IV. How to understand holistically players' game decisions and 'soft data' as a behavior of players, level of communication with others etc. (Heron: Confronting and Feeling)
V. Observation and feedback (Heron: Valuing)

According to Figure 5, training in general was perceived as helpful. Looking at the wish list, it becomes apparent that a training program focusing on facilitation would support the formal competency development and also fill a need identified by many of the respondents.

This first research question leads to looking at the results for the second research question:

ii. What could be relevant training courses for occasional game facilitators in higher education look like?

The answer to this question was somewhat negative (Figure 4). In the survey, 87% say it is learning by doing. In the author group, less than 20% had received formal training before starting their game facilitation. Overall, the share of formal training remains low. Comparing this with K12 teachers or professional vocational trainers, this low rate of formal training may reflect the overall low rate of structured pedagogical training in university teaching. There is however a change in higher education. While scientific excellence used to play the overarching role in applying for academic faculty positions, there has been a shift towards also focusing on teaching experience and competency during the last decade. This may relate also to an increased focus on the process quality within higher education [48]. More and more countries impose formal requirements on the didactical and pedagogical competencies, as a part of the appraisal procedure. Maturity models are widely used for assessing the maturity level within a specific area [49, 50]. Even though not frequently used, there are different maturity models also for higher education. For example, Zhou [51] has developed a capability maturity model of the e-learning process. Game facilitation is not primary about e-learning, since many games are haptic or board games, but Zhou has the dimension of process capability in his model, which is transferable for game facilitation and higher education. It comprises the levels (transferred from e-learning to GBL): (1) delivery – delivers facilitated GBL units, (2) planned – as clear and measurable objectives for GBL projects, (3) defined – provides a defined process for development and support of GBL, (4) managed – ensuring the quality of the resources and the deliveries, (5) optimizing – continual improvement in all aspects of the process. Matching the outcomes of the received training focusing on facilitation, it can be concluded that maturity is maximum at level 1. This might also be a reason the uptake is so low. Staff interested in using games for education, undergoes a time-consuming process of learning by doing. This leads to difficulties in delivering an acceptable quality in teaching during the first years. Considering that most of the facilitators just use such methods once or twice a year, shows the problematic situation.

Since it may be stated that there is hardly any training of facilitation of games provided, and knowing that more and more universities offer programs on higher education pedagogics and didactics, it would be relevant to know how the participants in this study rate the differences in competency needs. This leads to the answer to the third research question:

iii. How do the competencies of occasional game facilitators differ from the competencies needed for other learning approaches, such as lectures, problem-based learning, or online education?

Table 1 and Table 2 in section 5 address this issue. Using Stewarts competency model, it can clearly be stated that the participants see large differences in quite a few areas: For communication skills, the overall tendency is that this is less important in the facilitation of games, where non-verbal and written communication have the highest deviation (-1.2 and 1.0), but still relevant. This might be seen in the light of the answer given to the question of what type of games the participants use. The large majority ticked that they use games with inbuilt communication. For interpersonal skills, there are also large deviations, specifically on negotiation (-1.0) – this might also be that it is a part of the gameplay, and thus not so relevant for the facilitation. According to Table 1, the deviation related competencies on motivation both related to goal achievements and creative participation and on reward and recognition, is quite low, however there is a higher need for these competencies. These are also competencies, which were found on the wish list in the qualitative part of the study. Personal characteristic competencies seem on the other side to be less needed.

Summary and future work

Summarized, it can be stated that the maturity of game facilitation in higher education is low. There is a need for formal training courses, and competency models are hardly implemented in this field. As a matter of perspective, besides implementing trainings for game facilitators, further approaches are available for increasing the diffusion of serious games and the effectiveness of GBL. Figure 3, which has been discussed earlier, provides an overview of challenges, such as supporting motivation of players, to be covered by approaches for increasing the diffusion of serious games. For example, giving learners a choice to take part in GBL activities or to engage in some other learning activities is likely to increase learner motivation in the chosen learning activity [15, 52]. Likewise, the choice of the game employed itself has a great impact on learning success: learners have preferences for games depending on learner prerequisites, such as age, ethnicity, and gender [53, 54]. But certain game mechanics might be especially suited for GBL activities [55, 56].

This multi-method study investigates the competencies essential for game facilitation in higher education as well as analyses, based on empirical data, the perceived gap between essential and existing competencies. The paper also discusses if there is a structured approach for competence development for the target group. The findings indicate that there is limited or no general competence model for game facilitators and that casual game facilitators rarely undergo any specific, formal training. The lack of specific training is to be regarded as one reason for the lack of dissemination of games in higher education. The study provides the basis for a competence model for game facilitators that may serve as a prerequisite for the development of specific trainings. Future work includes the confirmation, consolidation and refinement of the competence model presented, such as by means of an extended survey for a larger group of participants. Based on the competence model defined, organizational policies for trainings are to be developed. With an increased dissemination of GBL because of growing game facilitation competencies, the effects on teaching in higher education have to be explored. However, one approach that could replace the training of game facilitators is the digital support or even the replacement of game facilitators by virtual assistants. thanks to the growing improvements in AI [57].

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Multimedia Appendix A: Facilitation with large groups

Designing facilitation activities for large audiences has to deal with an important scale factor to be

taken into account. Executive education in business schools and corporate universities provide good examples that can be used in higher education at all levels.

The use of social media, web technology and of collaborative platforms has been successfully implemented and already documented [59–62] in particular for what concerns the support to the debriefing phase of a GBL experience. Post-Game Learning Communities (PGLC) have been created to consolidate the game learning experience over time: the cohorts of participants (usually around 30 people, but up to hundred sometimes) have been gathered together around a community platform where they have had the opportunity to implement the learning outcomes that were devised by the game experience [63]. Here, the facilitator sets the floor to a learning-by-doing experience as a natural follow-up of the game experience and as long as that participants get confident with the new environment and the tasks they are given, plays more and more the role of an observer and a reporter of the activities performed in the platform in order to measure the learning impact on the audience that is, learners' ability to apply what they have been supposed to learn during the game experience.

These kinds of platforms [63] have been successfully replicated for different serious games in executive education and were also filling a gap in terms of awareness, knowledge and adoption of web 2.0 technologies among managers. Such experience has paved the way to the use of participative technologies and social media nowadays to support not only the debriefing phase and the follow-up of a game session, but the whole learning experience, game run included. Scalability is no longer a technical issue as video conferencing, social media, MOOCs, online collaboration tools and real-time online questionnaires are well established. The two last examples are significant as they provide solutions for blended learning settings and allow to get feedback from large gatherings in the real world. So, a facilitator has plenty of tools to tap in to reach large audiences. Therefore, the process of facilitation is more important than the instruments. The latter depends on the former. The process can be supported by the introduction of Liberating Structures [64] and cognate tools. These are more than a collection of facilitation techniques to foster innovation. They allow to address in a distributed and inclusive way complex situations by tapping into collective intelligence, provided that the proper settings are prepared. They have been designed to involve all participants, but the space arrangement plays an important role regardless of being physical, virtual or blended, give room for exchanges and self-expression. Here lies the secret to deal with facilitation for large audiences offline, online, and in blended environments: the more the facilitation is shifted towards delegation and self-regulation, the more effective and the better impact is expected. Large audiences are difficult to be controlled and observed at once. Therefore, the good strategy is to design facilitation in such a way to engage the audience in compelling activities involving everyone in first person [65] and with a shared purpose, by stimulating everyone's intrinsic motivation [66, 67] at the same time.

Official and unofficial Liberating Structures [68] can also be combined in sequences (strings), nested in one another as building blocks, and changed at will in as many variants as needed. Liberating Structures are conceived to a) share ideas, knowledge, experiences, b) reveal/discover opportunities/ generate ideas, c) analyze/diagnose/debrief, d) help/get help, e) strategize, f) plan. Even though they have been originally conceived for offline activities, they can be easily implemented online:

- "Gallery Walk" (aka "Shift and share") and "World Café" that best fit to spread knowledge and stimulate individual reflection on and team discussion around specific topics can be organized in breakout rooms.
- "Mini Constellations", "Critical Uncertainties", "Agreement-Certainty Matrix" and "Ecocycle Planning" are addressing issues and challenges visually on a map to express respectively the level of agreement, the different perspectives, and phases, all can be implemented by the combination of a videoconferencing system and a whiteboard as co-editing support – the facilitator has just to explain the context and the rules;
- "Wise crowds" (aka "Co-development" or "Mastermind") and "Fishbowl" which focus on peer support and experience exchanges (particularly useful for experiential learning implemented via role-playing games) can be implemented by a video conferencing tool with or without the use of

breakout rooms – the facilitator communicates the context and the rules, moderates the requests of intervention/involvement in the ongoing discussion and distributes teams in breakout rooms if required.
For what concerns brainstorming, the simplest way of implementing them on a large scale and asynchronously is using the so-called brainwriting technique.
The technical means and the procedural techniques are available to tackle any kind of audience offline and online, nowadays. What is most important with large groups is to change the facilitator's mindset that has to be keener on adopting a designer attitude in preparing the settings of the intervention and in involving the audience in active and self-regulating participation by leveraging on collective intelligence and inclusive facilitating techniques.

Multimedia Appendix B: Questionnaire - Educational scenarios

The questionnaire (section 5) included also questions aiming at the educational scenarios, i.e. in what form the game is embedded in the teaching. Again, the participants could choose from a multiple selection question (see Figure 6). With 80% the most common option is embedding the game in a lecture. The game is used in one lecture in such a scenario to achieve certain learning goals, allowing the preceding and following lectures to be designed independently of the game. The second most frequently mentioned scenario is the homework variant with 47%: learners are given the homework assignment to work with a game to achieve certain goals. Often such a scenario is prepared and followed up (briefing, debriefing) in the pre- and post-lecture. Nearly 43% of the participants use a game over several lectures while considering the same scenario. Here game facilitation accompanies the learners over a longer time and can also be described as a joint long-term developing of a particular scenario. The next variant (37%) is similarly structured: here, game facilitation also extends over several lectures. However, usually with the same game, different goals are aimed at.

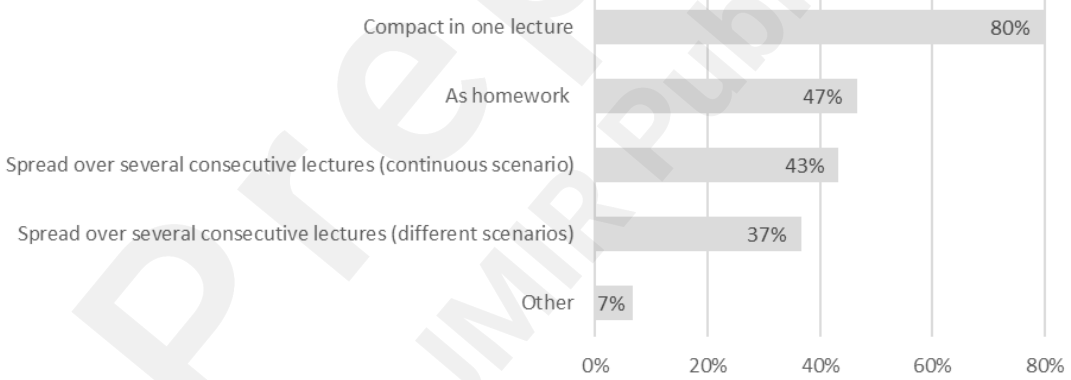

Figure 6 Educational scenarios used in facilitation (multiple selections per respondent, N=30)

Cohort size is also characteristic of an educational scenario. The most frequently mentioned cohort size is 16 - 30 (43%), followed by 6 - 15 (37%). A cohort size of over 31 learners is mentioned by 17% of the participants, while cohorts of less than 6 learners are indicated by only 3% of the participants.
The organizational conditions of educational scenarios have been evaluated (Figure 7). The most frequently referred to conditions of educational scenarios, with 80% of the participants naming each, are the communication between the learners, the utilization of multiplayer games and the use of one venue each. In 47% of the entries the game instances are connected via a network, e.g. "the students played individual 'cities' that were connected to 5-6 other students' 'cities' in the virtual environment.". The use of single player games (37%), players distributed across different locations (37%), no communication between players (7%) and multiplayer games without interaction between players (3%) are hardly mentioned. Interestingly, in 20% of the responses the community of the game used is included in the communication of the players beyond the educational scenario.

Complicating conditions for some games are the need for software licenses (37%) and the ties to dedicated rooms (23%).

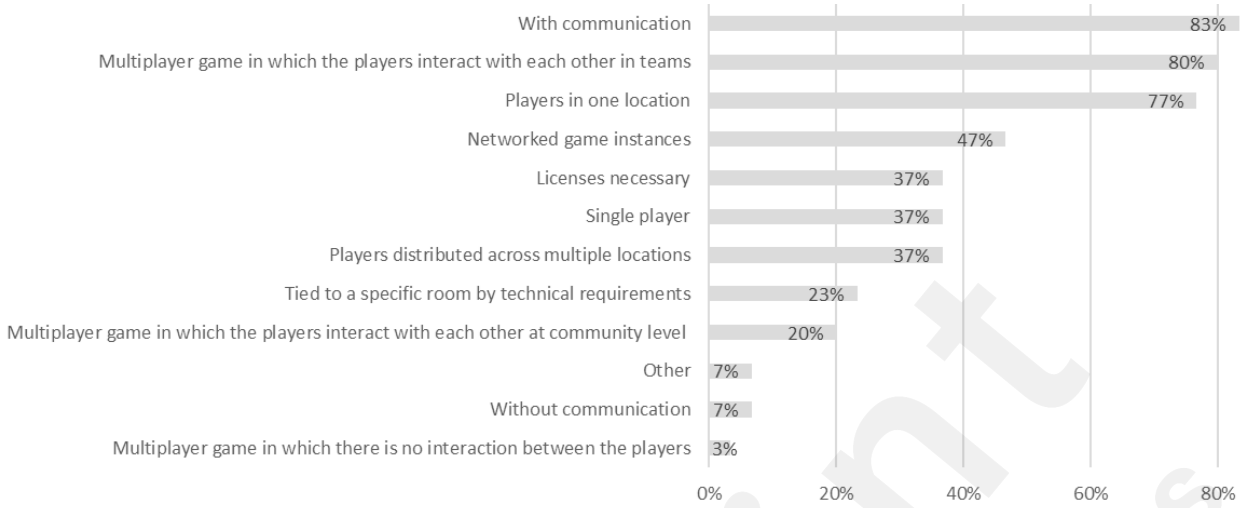

Figure 7 Organizational conditions (multiple selections per respondent, N=30)