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Analysing Different Game Design Strategies

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Facilitating an Educational Board Game Jam: Analysing Different Game Design Strategies

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Abstract: There is a long tradition of using board games for educational purposes. Moreover, the growth of the game jam events where participants typically gather at physical locations with an aim of creating new games, has expanded over the last decades. This paper is based on an exploratory study, where we wanted to create a game jam for teachers, student teachers, facilitators, and consultants interested in designing and redesigning board games to enhance learning for different target groups. With a point of departure in design thinking, the game jam was framed through three phases: ideation, build a board, and playtesting. The participants were given the challenge of designing a board game incorporating co-op elements such as collaboration, problem-solving in teams, collective efforts towards a mutual enemy, etc. The game jam was held in a university college where the participants had access to a variety of materials such as pens, papers, cardboards, and discarded board games. The empirical data consisted of observations of participants, who were divided into groups of 2-4 persons based on their prior game experiences and game interests. The analysis presents preliminary findings in relation to the participants' different strategies for developing board games. The empirical data showed how the groups struggled to balance simplicity vs. complexity in their designs in relation to both time frame and target group of their board games. The playtesting session fostered discussions around the essential game mechanics and elements of each board game prototype. Furthermore, the ongoing feedback and playtesting created a joyful and curious bridge between the groups. Based on the analysis, the paper presents a series of design principles aimed at facilitating educational board game jams.

Keywords: Board game jam, Educational games, Design thinking, Facilitation, Learning, Collaboration

1. Introduction

There is a long tradition of using board games for educational purposes. Within recent years, there has been a growing interest both in playing board games as a leisure activity and using them for educational purposes. This interest is also reflected in the increasing number of studies on board gaming in educational contexts (Bayeck, 2020). It is possible to identify different pedagogical approaches to using board games for teaching. Based on the distinction of different game-based pedagogies put forward by Nousanen et al. (2018), we can discern between: 1) the use of entertainment board games (e.g., *The Mind* or *Settlers*) for educational purposes, 2) the use of board games with more or less explicit learning content (e.g., using *Scrabble* for learning to spell or *Periodic* for learning the periodic system), and 3) learning through the process of designing educational board games. It is the latter approach that is the focus of this paper. We aim to explore the facilitation of a *board game jam* as a format for learning and game development, contributing to educational discussions. Our study may inspire educators and researchers while paving the way for future exploration.

A game jam is an event in which participants gather at a physical location with an aim of creating new games, which may be intended for entertainment or aimed at educational contexts. The aim is to create a workable prototype or complete game from scratch within a limited time frame, e.g., one or two days, and then share the results (Kultima, 2015). The format of game jams, which originated in informal settings outside education, has expanded over the last decades and has increasingly come to be viewed as a site for learning. Studies suggest that game jams may be pedagogically compatible with formal general education and are able to increase motivation and self-efficacy (Aurava et al., 2021). According to a review on game jam research by Meriläinen et al. (2020), game jams can be viewed as activities for developing technical skills needed for game development, but also for developing so-called soft skills such as collaboration and communication skills, and to teach and learn subject-specific content within science, technology, engineering, arts and/or mathematics.

Even though board game jams offer many possibilities for engaging in creative learning processes and the development of numerous skills through the co-creation of new game prototypes, they also involve several challenges to consider (Meriläinen et al., 2020). One challenge concerns the limited time frame of a game jam and how it fits into the time schedules of existing educational systems. Another challenge concerns the practical issues of planning, organising and facilitating game jams, where participants are invited into a safe environment, which provides them with sufficient support and guidance on their design processes as well as

relevant game tools and materials to work with. Finally, it is also important to consider the importance of the participants' game literacy, i.e., their prior experience as well as their knowledge and understanding of specific game mechanics or game formats. As a study on the use of games in teacher education has shown, student teachers' game literacy and motivations for playing games may vary significantly (Lieberoth & Hanghøj, 2017).

For the purpose of the current paper, we are mainly interested in how board game jams for educators can be organised and facilitated. By educators we refer broadly to a mixed group of student teachers, in-service teachers, pedagogical consultants as well as developers of learning materials. More specifically, we wish to explore the following research question: *How to facilitate an educational board game jam that addresses the participants' different prerequisites and support their different game design strategies?*

The empirical case for our study is based on observations and field notes from an open one-day board game jam for 30 educators that was arranged and facilitated at a university college by the authors of this paper. This means that we as authors have all taken on the dual roles of being both organisers/facilitators of the game jam as well as researchers that try to explore the participants' design processes. The theoretical perspective of our paper is informed by research on board games and design processes. Based on our analysis of how four different groups engaged in their board game design processes, we conclude the paper by presenting and discussing design principles for facilitating educational board game jams. The design principles concern: 1) The importance of having a clear "point of view" when developing an educational board game, 2) the need for developing a shared understanding of subject domain and game format, and 3) the balancing of game mechanics with learning content.

2. Method and Empirical Data

Our methodological approach to organising board game jams is grounded in Design-Based Research (DBR), which aims to generate local theories and develop new designs for learning through iterative cycles of design, use, and analysis (Barab & Squire, 2004). Moreover, DBR interventions often involve the development of design principles, which serve as guidelines for other researchers and practitioners, who wish to carry out similar design experiments (Hanghøj et al., 2022a). Following a DBR approach, the board game jam is considered a pilot study, and should be seen as an intervention, where we seek to both understand and develop the format of using board game jams for educational purposes. Researchers within DBR emphasise how design experiments can be viewed as sometimes reflective and sometimes prospective (Cobb et al., 2003). The analysis is based on reflections of our participatory observations while the discussion has a more prospective focus with the presentation of design principles.

As mentioned, the authors of this paper enacted different roles in the design experiment such as preparing for and carrying out the board game jam as well as conducting a retrospective analysis (Cobb et al., 2003) of the participants' design strategies. This places a demand of reflecting the challenging role as DBR researchers: "Design-based researchers are not simply observing interactions but are actually 'causing' the very same interactions they are making claims about" (Barab and Squire, 2004, p. 9). To address this challenge, we all made individual field notes during the board game jam where we also had different tasks as facilitators e.g., introducing the different design phases of the day. Afterwards, we compared and discussed our observations and patterns across were categorised into an analysis of participants' different strategies of developing board game designs.

The empirical data consists of participatory observations and pre-questionnaires answered by 30 educators / participants based on their experiences of developing games. At the jam, the groups were divided into groups of 2-4 persons according to the participants' game interests expressed in the pre-questionnaire. The programme of the day consisted of different phases inspired by design thinking which encouraged an iterative approach to game development (e.g. Kolko, 2010). The board game jam lasted 7 hours primary focusing on three design phases: 1) Ideation, 2) Build a board, 3) Playtesting.

3. Theoretical Approach

This paper takes a theoretical point of departure in the architect and educational researcher Donald Schön (1983) who argues for reflective practice to be privileged over technical rationality in all professional work. His theory is derived from the way architects work, going into dialogue with materials, that is going into a 'back-talk' of the situation (Schön, 1983, p. 79). Inspired by the ways architects and designers work through sketching their ideas, we encourage participants in our study to engage in an explorative conversation with the materials and other group members when developing and communicating their design ideas (Twersky & Suwa,

2009). Throughout the different design phases, the participants are given the challenge of developing co-op games which can be interpreted in different directions. Thus, the participants are tasked to actively set the stage for their game design according to their own game interest within the overall assignment. Schön elaborates how a large part of working as a designer is identifying the problem and the context for which a variety of solutions are carried out and tested. He emphasises: “Problem setting is a process in which, interactively, we *name* the things to which we will attend and *frame* the context to which we will attend to them” (Schön, 1983, p. 40). In the analysis, we will outline examples of the ongoing naming and framing of the situations carried out in the groups. Here, the participants actively negotiate their angles on developing a co-op game for educational purposes.

Based on Schöns theory, designer John Kolko (2010) explains how designers’ intentional *reframing* of situations is essential to attend the design from different perspectives. Through an active exploration of seeing a design solution from a variety of perspectives, the designers can imagine the position of different target groups and negotiate meaning of their understanding of the design. Kolko also expresses how the work with materials and the activities of ‘getting things out’ (2010, p. 18) can help designers to identify and draw connections between elements. Here, inspiration can be derived from many different sources which can be bridged into a ‘synthesis process’, where the designers collaborate on deciding which elements are more important than others (Kolko, 2010). In our study, we ask the participants to draw on their prior experiences of gaming and development of game designs when naming, framing and reframing their game situations, including their divergent experiences of working with specific game mechanics, which refer to the various actions, behaviors and control mechanisms afforded to the player within a game context (Hunicke et al., 2004).

In contrast to professional board game designers, the participants in an educational board game jam will often have quite limited knowledge of and experience with the broad range of different board game mechanics such as, e.g., worker placement, player elimination or resource management (Engelstein & Shalev, 2022). In the words of Schön (1983), this means that the participants will have a limited *repertoire* of knowing specific game mechanics, and how they could be applied for pedagogical purposes. During the course of a board game jam, there is limited time for learning new game mechanics. This means that the participants will have to rely on their previous experiences with games and their existing subject-specific knowledge of the target game domain (e.g., mathematics or insurance policies), when trying to design educational games that create meaningful links between game mechanics and specific learning objectives. Given the short time frame of a board game jam, it is important that the participants are able to quickly establish strong links between their chosen core game mechanics and the learning objectives of their game design. A key factor here is the *complexity* of their game design ideas, which both relates to the complexity of specific game mechanics and the complexity of the intended learning outcomes of the game (Wardaszko, 2018).

4. Analysis

The analysis consists of four different examples of participants’ strategies when developing a board game design. Each example is divided according to the main activities during the design phases, namely: *Ideation*, *Build a board*, and *Playtesting*. The groups got feedback on their game design from peers and facilitators throughout the day, but mainly during the playtesting at the end of the day.

4.1 From Initial Undefined Idea to a Playable Prototype

In this example, the group (hereafter Group 1) consisted of three employees from an insurance company. In their daily work, they had different roles: One employee being an issue expert in insurance while the two other employees were learning designers in their company. All three had a common interest in making a board game to support couples, who are struggling with economic questions such as division of property etc. after a divorce. As a point of departure, the group started the game jam with a joint theme and a clear point of view for the game, but no preparation of materials, expanded development of the specific game mechanics or game design.

Ideation: In this phase, the group members agreed not to “lose themselves in details” to get a game design finished by the end of the game jam. Based on concrete rules from a regulation document on division of property, they created expected dilemmas which newly divorced couples would have to address. Here, the roles in the game were clear, as they consisted of the main characters of the divorced couple and their insurance counselor.

Build a board: In the building phase, Group 1 became more concrete regarding the target group for their game design. They explained how the counselor was the primary target group of the game and the clients in the

roles of the divorced couples would be the secondary target group in the game. During the ideation phase, the group received feedback from another group that led to more focus on which possible incentives the parties of the divorced couple might have in a negotiation, e.g., regarding economy, friendship after the divorce, etc. Based on the feedback, they *reframed* and discussed different perspectives (Kolko, 2010) on the game seen from both the primary and secondary target groups' point of view. The group used different materials to create cardboard characters of the different roles in the game (see figure 1).



Figure 1: Cardboard characters (left) and the divorced couple's effects for division after the divorce (right)

Playtesting: In this phase Group 3 enacted play testers for Group 1 and vice versa. In the beginning of the playtest, the group discussed how the title of the game 'The pension battle' provided a stage for an interesting narrative in the game. The two members from Group 3 were given the roles of the divorced couple, while the issue expert in insurance from Group 1 played the counselor who frequently presented new cue cards and regulations for the divorced couple to act upon. The fact that the roles and effects (car, house, summerhouse, etc.) (see figure 1) were explicitly explained and materialised, made the prototype accessible for playtesting. The play testers clearly identified with the characters and enacted the roles of a divorced couple fighting using the materials on the table (see figure 2).



Figure 2: Playtesting of group 3's prototype

The outplayed scenarios led to laughter among the two groups and a relevant discussion on the complexity within the subject matter, e.g., how to balance a realistic scenario of a divorce, but also not to encourage participating couples to escalate a fight. Here the intention of illustrating players' different incentives was up

for discussion, also to encompass a reconciled intention among the players. How might ‘an ideal division of property’ looks like played out in a scenario, were suggested to be framed in a future redesign of the game.

4.2 From a Joint Point of View to Drowning In Complexity

The group consisted of two in-service teachers from different schools (hereafter Group 2). They had a common interest in developing a board game design revolving around the climate crisis. Thus, they quickly *named* the subject matter for their game design. The target group for the game was supposed to be students in lower secondary education in the disciplines of geography and social studies.

Ideation: The group started their ideation phase with one of the group members mentioning *Terraforming Mars* as a co-op game for inspiration when developing their own climate crisis game design. *Terraforming Mars* is a strategy game, where each player enact the role of an organisation with the goal of making Mars livable. The game is relatively complex (it is rated medium to medium-heavy on Board Game Geek) and requires approximately 2 hours playing time. Based on their inspiration, the group discussed four different roles for the students to take in the game, each representing a specific organisation: a politician from a political party, a doctor from Médecins Sans Frontières (MSF), a member of NATO, a member from the European Union (EU). The group argued for a minimal reading of rules while discussing time concerns for integrating this kind of game design in schools (2x45 mins/week). One of the group members brought an overview of different game mechanics which the group members discussed how to implement in the game.

In a short feedback session with Group 3, Group 2 had difficulty explaining the purpose of the game design. In this way, the group had an overall problem area that they wanted to address in the game (the climate crisis), but they lacked a concrete point of view in the game. The roles such as ‘a member of NATO’ were too broadly described and did not specify what actions the roles were able to perform in the game. In contrast to Group 1, it can be argued that Group 2 ‘lost themselves in details’ in the game mechanics before they had a clear joint theme for their game design. Here, they intended the game design to contain too much complexity, which discouraged them from *framing* a manageable context for their game design idea.

Build a board: Shortly after the feedback from another group, Group 2 split up amicably as they were not able to come to an agreement on how to reframe their initial game idea. It can be argued that the balancing of subject matter, game mechanics and the requirements of the target group became too complex for the group to navigate. Eventually, they did not complete the build a board nor the *Play testing* phases

4.3 From a Clear Aim to a Discussion About Game Characteristics

In our third example, Group 3, consisting of two educators from a teacher education, the group members had a clear aim and point of view with their game. With a focus on the co-op challenge of the game jam, they wanted to create a board game where players were encouraged to discuss different teaching dilemmas to negotiate joint solutions.

Ideation: In the initial ideation phase, the group discussed different target groups for their game, but ended up with student teachers as their main target to discuss different dilemmas experienced in their daily practice, e.g., during their internships. Group 2 took inspiration from a popular Danish radio talk show, where ordinary people can ask three famous people for help regarding a current dilemma in their lives. However, the group adjusted the game to revolve around dilemmas from pedagogical contexts where all concerned should discuss the dilemma from different perspectives in a role play. In a short feedback session with Group 2, Group 3 explained an example of a predefined dilemma in the game: A group of student teachers had their class of students on a field trip to a museum and the atmosphere was very loud and chaotic. Afterwards, the museum complained to the school management about the visit, but confronted with the complaints the student teachers did not see the problem. Hereafter, different parties in the discussion of the dilemma were presented. Based on the presented scenario, the two groups discussed whether this idea could be characterised as a board game. The groups agreed on the strong focus on creating a narrative framing of possible dilemmas for the student teachers to enact and discuss afterwards. At the same time, the game concept lacked the use of other game mechanics such as being able to win or lose against a joint enemy.

Build a board: In the building phase, the group members in Group 3 further discussed the essence of their game stating that: “Some people might not see our game as a board game. It depends on which definition you have of a board game”. Still, they continued their iterative process of making a synthesis between their different elements of inspiration (Kolko, 2010). They wanted to maintain the focus on dialogues around dilemmas, but with more focus on involving the players into the development of the co-op game. Therefore,

they *reframed* the context and roles in the game to not only concern predefined dilemmas. In the second iteration of the game, the student teachers themselves should take both the role as a proposer of dilemmas and as joining parties negotiating possible solutions on the dilemmas. In this way, the group members emphasised that the content of the game ought to be user-created.

Playtesting: In the playtesting phase, Group 3 had created a scenario of an expanded identity dilemma situated at an independent boarding school for secondary students. The prototype involved an A3 with the dilemma explained in writing on one side. Therefore, the playtesting began with Group 3 reading a lot of text for the play testers from Group 1 (see figure 3).

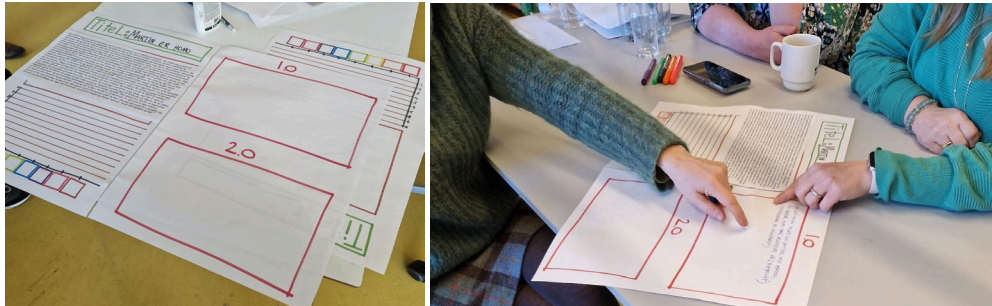


Figure 3: Group 3's prototype of their dilemma game (left) and playtesting of the prototype (right)

After the introduction to the dilemma, the members of Group 1 were given different roles in order to discuss different solutions; role as teacher, headmaster and student. To implement more game mechanics, Group 3 had added 10 points in the game, where Group 1 should decide who to give points according to which level of influence the player had in resolving the dilemma. The idea with points was explained as 'an experiment' and the relation to the framing of dilemmas was not entirely clear. However, the aim of providing a space for negotiating dilemmas were redeemed as Group 1 actively discussed the dilemma from a variety of perspectives enacting the different roles in the game (Kolko, 2010).

4.4 From a Developed Prototype to Refining a Game

Our last example concerns a group (Group 4), who brought an almost fully developed board game prototype to the jam, which they wanted to further test and refine. The group consisted of four: an independent learning consultant, an experienced science teacher and two science teacher students. They all had a strong interest in board games, and the latter three knew each other from working together at the same school.

Ideation: The group had chosen to work on refining a specific board game that aimed at learning secondary students about different types of energy supply. Thus, the *naming* of the core subject matter was clear from the beginning. In the game, each player should try to create as long supply lines as possible for a city using different types of energy. The group initially agreed that the game prototype was quite complex with many different game mechanics and layers of information (Wardaszko, 2018). In this way, the key focus for their design process was to further *reframe* and simplify the core mechanics of the game to make it more playable in a school context.

Build a board: During the "build" phase, the group explored different aspects of how the mechanics of the board could be further simplified. The main designer of the game had initially chosen to design octagon-square tiles as he believed that the hexagon-tile format was copyrighted. However, this format created "dead space" between the tiles and made it difficult to read the board. When the legal misunderstanding was cleared away, the group quickly designed hexagonal tiles for the board game, which created a more coherent visual impression (see figure 4).



Figure 4: This image shows how the group is leaving behind their original octagonal shaped game prototype idea (at the bottom) in favour of hexagonal shapes (at the top)

Playtesting: During the playtesting phase, the participants and facilitators focused on the game cards, which involved quiz questions for the students - e.g., on how to calculate effect or understand differences between direct current and alternating current. These questions were clearly relevant for the science curriculum, but they had no direct links to the player's actions and mechanics in the game. After discussing this lack of meaningful link between quiz questions and game actions, the group decided to drop the exogenous game elements (Squire, 2006) by removing the question cards from the game and instead focus more on the procedural learning that could result from playing the game and working with different types of energy supply.

In summary, the members of this group were quick to find a common focus and shared language for their redesign processes. Likely explanations for this were that the group members knew each other from beforehand, had a shared understanding of the subject matter and were quite experienced board game players.

5. Discussion

The analysis shows how the four groups used different strategies for developing educational board game designs. Briefly summarised, we saw analytical examples that included: a group moving through the whole process from undefined initial idea to playable prototype; a group that ended up “drowning” in the complex possibilities of their game design space; a group that developed a prototype, which they felt lacked sufficient game elements; and, finally, a group that mainly chose to refine and reframe an existing game prototype. Taken together, we have chosen these four examples to illustrate the relatively large variation that we observed during the game jam in the participants' different prerequisites and game design strategies. Following our DBR approach and the analytical examples above, we will now present three design principles, which all focus on the key role of the facilitators in organising and supporting participants during educational board game jams.

Design principle #1: Having a clear “point of view” when developing an educational board game

This design principle concerns the crucial process of being able to name and frame a game idea during the initial process of the game design process. All groups succeeded in naming their design challenges, but not all groups managed to frame their game ideas into successful game concepts. The facilitators need to support different starting points for the group processes by scaffolding questions and feedback accordingly. Some groups knew each other beforehand (e.g. Group 1 and 4) which most likely influenced how their strategies of naming a specific point of view for their game started before the ideation phase at the board game jam. It is also relevant to support and challenge dialogues for the groups to prioritise which challenges to be addressed in their design processes. For some groups the intended outcome of the game became too complex (Wardaszko, 2018) to navigate which led to stagnation in their game development, e.g., Group 2. On the other hand, Group 2 contributed to a relevant discussion with Group 3 regarding core elements of a board game. We consider these kinds of dialogues as a significant part of game jams for the participants to exchange point of

views and further develop their repertoire (Schön, 1983). Of course, with a focus of striking a balance where the progression in the game development is still central.

Role of facilitators: Supporting divergent and convergent design processes in terms of helping participants to open up the challenge, which they wish to address. Scaffolding of questions in the ideation phase to support a realistic framing of the intended challenges and learning outcome of the game. Facilitating space for participants to discuss different point of views on educational game designs.

Design principle #2: Developing a shared understanding of subject domain and game repertoire
This design principle concerns the formation of groups, which can create a shared understanding of the topic (domain knowledge) as well as their game repertoire. This does not necessarily mean that all the participants should have the same knowledge or understanding of the domain or a similar game literacy. In fact, the participants in Group 1, which succeeded in creating a playable prototype of their game from scratch, consisted of a mix of expertise in the target domain and in design skills. Similarly, even though the members of Group 2, had a shared passion for the complex board game Terraforming Mars, they also had limited knowledge on how to address climate issues in a board game format. In this way, they had difficulties with complementing each other when designing a game for a complex topic on which they did not have deep knowledge. Based on the analysis of participants' strategies, we will argue that a group (or "design team") needs different skills and competencies to create a successful educational board game, which cuts across domain-specific knowledge, game knowledge and knowledge of the pedagogical context/target group (Hanghøj et al., 2022b).

Role of facilitators: Awareness on forming groups where participants can support each other and develop a shared point of view and shared understanding of subject domain knowledge. The use of a pre-questionnaires answered by the participants with a focus on their interests and experiences of developing games can support the division of groups.

Design principle #3: Balancing game mechanics with learning content

The final design principle concerns the balancing of game mechanics and learning content. As the previous design principle suggested, it is important for participants not only to mutually identify, but also to agree on how to simplify game ideas and core mechanics for playable prototypes that can fit with the constraints of educational settings - e.g., tight-packed time schedules, specialised curricular knowledge, and students with varying levels of game literacy. However, there is another aspect to this design principle, which concerns the removal of exogenous learning content, which has no clear or meaningful function within an educational game (Squire, 2006). This was particularly the case in example four, where the group refined their game design and decided to scrap test questions for the students that had no integration with the game mechanics and objectives of the game. Furthermore, for some groups (group 2 and 3) the level of text reading were questioned and discussed in relation to balance information load related to the learning content and the game mechanics. Here, a question of simplifying content and rules to have an appropriate level of complexity were a topic for discussion.

Role of facilitators: Scaffolding questions that bring awareness in groups about how to work with learning content suitable for the game context. Providing ongoing feedback for participants to simplify the game content into playable prototypes.

The limitations of DBR projects are that replication is difficult due to the study of a local context involving specific participants. However, by providing rich descriptions of context and the emerging design principles (Barab & Squire, 2004) our intention is to encourage further exploration on how to facilitate an educational board game jam. The robustness of the design principles would be strengthened when tested in new local contexts.

6. Conclusion

The aim of this paper was to explore how to facilitate an educational board game jam that addresses the participants' different prerequisites and support their different game design strategies. Analysis revealed differing approaches to iterative development and testing. Crucial factors included material use and balancing complexity in game mechanics and learning content for developing playable prototypes. Based on four identified strategies among the participating groups, the paper presents three facilitation-focused design principles for educational board game jams:

- Design principle #1: Having a clear "point of view" when developing an educational board game.

- Design principle #2: Developing a shared understanding of subject domain and game repertoire.
- Design principle #3: Balancing game mechanics with learning content.

To some degree, these design principles echo prior research on game jams (Meriläinen et al., 2020; Aurava, 2021) and research on how professional designers work when creating learning games (Hanghøj et al., 2022b). Our study emphasizes facilitators' pivotal role in planning, group formation, feedback, and evaluation. Retrospective, we suggest more guidance for groups who either drowned in complexity or lacked ideas for relevant game mechanics for their design ideas. The pilot study underscores the need for educational game jam facilitation to aid participants in creative processes. Our experience supports advocating multi-facilitator approaches, distributing tasks and leveraging individual expertise (Schön, 1983). Exploring facilitators' roles and prerequisites in educational game jams presents an intriguing topic for game researchers.

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