

Flexible Gamification in a Social Learning Situation. Insights from a Collaborative Review Exercise

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Abstract: We discuss the challenges of applying a game design frame on a learning activity, through a case study of a gamified collaborative review exercise. We distinguish problems of gameplay from problems of divergence between game and non-game logics. Using Béguin & Rabardel's theory of instrumental genesis we observe how the gamification instrument shapes the review activity, in the process of continuously adapting artifacts and users' activity schemes. We identify locally emergent solutions to the divergence issue: players resort to half-engagement with the game and tailor gameplay strategies, selectively ignoring, observing or bending rules such as to manage the relative priorities of game and non-game objectives. In our case study gamification is more than an engine for fun: it facilitates learning by structuring the collaborative activity in memorable events with specific tempo, attention focus, and communication style. Constant adjustment enriches learning and becomes part of the game.

Introduction

Gaming has become a widely available reference in diverse activity contexts. Accordingly, games have become a resource for designing collaborative work and learning solutions. In this paper we investigate the design of gamified learning exercises through a case study, relying on the instrumental genesis theory of Rabardel and Béguin (Béguin & Rabardel, 2000; Lonchamp, 2012).

Gamification does not involve the deployment of a full-fledged serious game; instead, it represents a method of cultivating intrinsic motivation and intense involvement in a non-game activity, by making use of game design principles and techniques. In brief, gamification represents “the use of game design elements in non-game contexts” (Deterding, Dixon, Khaled, & Nacke, 2011).

Gamification has been a contested practice. Bogost (2011) points out that the concept itself makes the process of design seem like a mechanical, simplistic application of elements to transform an activity, thus running against the complexity of game design. Authors have proposed alternative, critical names for these practices, such as “exploitationware” (Bogost, 2011) and “pointification” (Robertson, 2012). Still, gamification has continued to gain currency not only in business ventures but also in education, and it has also grown as a research topic. These critiques have served to highlight risks for both users and proponents of games as valuable cultural forms. Our research begins with the realization that gamification is not hazard free, and that the design process must anticipate challenges and allow for local adaptation.

We look at gamification as an *instrument* that mediates a collective activity, following the theoretical framework of Rabardel and Béguin (Béguin & Rabardel, 2000). They define the instrument as an ensemble consisting of an *artifact* and users' *cognitive schemes* for working with it. Consequently, the genesis of an instrument does not refer strictly to artifact design, but includes its gradual development into an instrument-in-application, which takes place always in here-and-now situations of use. The authors distinguish two types of processes in instrument genesis: *instrumentalization*, in which the artifact is changed, and *instrumentation*, in which user schemes are adapted. We study gamification as an instrument consisting of:

- a) *The gamification artifact*: it mainly consists of a structure of game-related symbolic and material elements that are used to create a *game layer* for an activity. Interface features such as avatars, levels, badges, points and leaderboards are often used; elements may also be selected from deeper levels of game design, including game mechanics (time constraints, limited resources), heuristics (clear goals, obstacles, feedback, collaboration and competition), models (challenge, fantasy) and design methods (playtesting, playcentric design etc) (Deterding et al., 2011). The gamification artifact also includes an *accessory set*, with auxiliary elements that are used to put in practice the gamified exercise: hardware and software, furniture, paper, food and beverages etc;
- b) *Cognitive schemes*: they refer to participants' schemes for dealing with the gamification artifact; for example, participants may end up “using” or “playing” a gamified application (Deterding et al., 2011).

We define flexible gamification as the process of framing a non-game activity as a game, through a process of instrument design and adaptation in actual situations of activity and play. Our research question is: *What types of influence does flexible gamification have on a social learning activity?*

We address this question by examining two sessions of play in “Revision Fever”, a gamified exercise for a collaborative review project, and by studying its gradual construction, as an instance of instrumental genesis (Béguin & Rabardel, 2000). Our case study relies on observation throughout the development and

implementation of the “Revision Fever” exercise, on 11 interviews with different types of participants (designers, players, judges, and an observer that attended the two sessions of play without game involvement), and on analyzing the internally produced documents (correction tickets).

The “Revision Fever” exercise

Our case study is situated in a Cisco Academy Training Center, about to begin a new semester of CCNA professional courses. The instructor team had just started to plan the yearly revision of its course presentations, in order to correct various errors and improve their content. In previous years, this activity consisted in allocating presentations to individual instructors, who would correct and submit them in revised form. This work was considered tedious, and in some cases instructors seemed to do the job poorly, postponing it until the final hours before the deadline. Also, this organization of the review activity did little to stimulate learning in the instructor team; while some individual improvement of technical concepts was expected, there was no latitude for sharing knowledge between senior and junior instructors. Also, individual work did not afford a collaborative, reflexive feedback on the team’s own standards and styles of elaborating course presentations.

From a coordinating position, we decided to organize this year’s review as a game, specifically as a competition between teams of instructors; we designed the gamification artifact, which was implemented in the same week. The artifact, called “Revision Fever”, relied on four game mechanics:

- a) Group competition: instructors were grouped in 3 teams of 5 members (each including at least a senior instructor), which collectively reviewed presentations. They reported errors and solutions to a judge committee of 3 members (all senior instructors), who could approve or reject “error tickets” via the Trac 1.0 issue tracking system⁽¹⁾. Tickets were classified in five categories (typo, graphic design, rephrasing/rewording, wrong concept, missing concept). Teams won points for each approved ticket. For example, a typo ticket (worth 1p) indicated “reliability → reliability”, while a wrong concept ticket (8p) indicated “The data is encrypted -> the data is not encrypted, the data is protected against modification”. Points could be spent in the internal game market (see below). The exercise was organized as a 3-hour session of collective, face-to-face gameplay. The team with the highest final point score won the game.
- b) Limited resources: each team of 5 members started with only one computer, one chair, and two presentations to review. Teams could then buy in the game market other computers (for 30p each), additional presentations (20p), more chairs (5p), or glasses of water (5p) and pizza slices (10p).
- c) Alternative play strategies: teams could design their own strategy around key variables such as: a) division of labor; b) focus on selected types of error tickets; c) choices in investing / spending points.
- d) Game self-regulation: judges were allowed to change any game rule at any time, and to adjudicate conflicts.

The first session of the game accomplished a revision of 11 presentations out of a total of 31. Teams submitted 260 error tickets out of which 208 were approved. After the first session, we have conducted interviews and, partly based on our discussions, we proposed a modified version of the game, which was implemented in a second session of review. We have also conducted interviews after the second session.

Results and discussion

We have identified two sources of difficulties when using game design for non-game activities. On the one hand, regarding *gameplay*, (some) game elements may not be experienced as meaningful by (some) participants, thus failing to create motivation and engagement. On the other hand, especially if the participants do start to act gamefully, there is a risk that the *game logic and objectives will develop at the expense of the main activity logic and goals*; for example, in-game competition may hinder requisite collaboration, or it may drain a large part of available resources. We shall illustrate both categories and the adaptive processes of instrumentalization and instrumentation through which they were addressed in “Revision Fever”.

Gameplay challenges

Several elements of the game layer were not well balanced. During the first session, nobody spent points on water and pizza, since all teams opted to invest in computers and presentations; therefore, participants worked with an unanticipated degree of discomfort. More importantly, the first session struggled with a ticket bottleneck: the 3 judges were unable to assess in real time the incoming ticket flow. Because tickets were not approved, teams did not have enough points to buy additional presentations and computers.

In order to deal with disruptions in gameplay, the instrument evolved on both dimensions: artifact development and scheme adjustment. *Instrumentalization* (change of game design and other tools) was visible from early on: judges adjusted prices, and pizza (when cold) was finally distributed for free. Between the two sessions, the role distribution was changed to include 5 judges, solving the ticket bottleneck. Also, teams could buy presentations on credit. The software infrastructure of the 2nd edition added Dropbox⁽²⁾ to the issue tracker, to allow judges to verify in real time the revised materials.

Some artifact changes were decided by judges in order to address a visible problem; others emerged spontaneously, in interaction. For example, when trying to find a rule for attributing two newly arrived senior

instructors to the playing teams, in the 2nd session, the idea of an auction suddenly came forward: teams would bid with points for including an additional member for 15 minutes; the member goes to the highest bidder. Auctions then took place every 15 minutes, and they constituted, in effect, a major change in the game: teams publicly competed throughout the game, in lively verbal exchanges. Our respondents considered auctions to be the most fun element of the 2nd session.

Adjustment by *instrumentation* can be observed in the gradual consolidation of gaming attitudes and strategies. By and large, players stuck to the rules, and no individual exceptions were formally admitted; still, there were occasional instances of tolerated cheating on some rules (free glasses of water, a chair that was spirited away without payment).

Game – activity divergence and convergence

The divergence of the game logic with the review and learning logic has been a major concern from the initial design stage. This is why the first version did not require players to actually implement their proposed corrections: we feared that, in the rush for point accumulation, players would introduce other errors in the revised materials. Still, we did not reach a viable solution for implementing tickets outside the game. The second session introduced the rule that tickets be sent only after the slide is corrected, and judges were in charge of verifying slide repairs. After the game, participants evaluated this solution as effective.

Other instances of divergence were also noticed and addressed. In an instance of *instrumentalization*, judges had to declare minor typos (such as missing diacritical marks) ineligible, because players would submit them in large numbers, as a facile source of points, thus presumably ignoring more substantive errors. The 2nd session required teams to correct typos, but they could not be reported for points any more. Teams in the first session started with only one computer for all 5 members, and participants considered that it led to a period of low fruitfulness; the second version started from two computers per team.

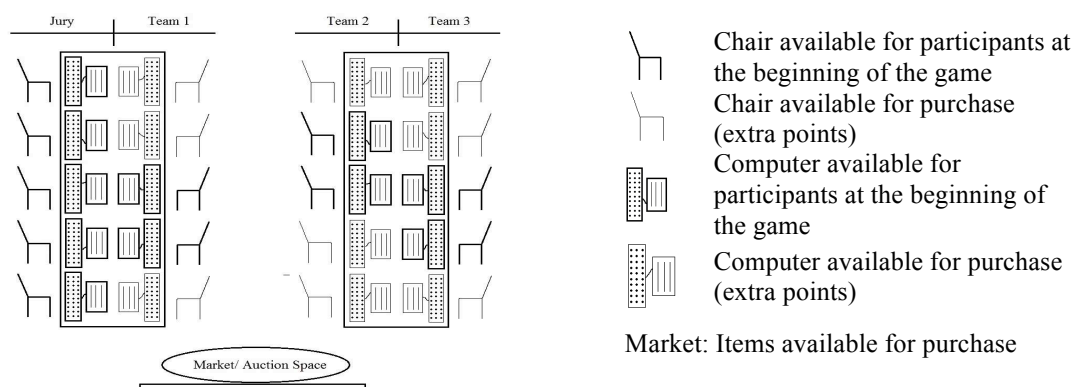


Figure 1. Organization of the RF exercise work space (second session)

We also observe an *instrumentation* process in which players and judges gradually position themselves on a continuum between engagement and disengagement with the game layer, thus managing the relative priority of the main activity (collaborative review). The resulting solution consisted in *half-engagement*: players constantly acted in ways that were at odds with the game logic, in order to review the materials meaningfully. For example, there was continuous collaboration between members from adversary teams, and between team members and judges, in order to settle technical disputes. Collaboration in the 2nd session was (inadvertently) encouraged through the accessory artifacts, specifically the gaming space: player and judge teams were positioned facing each other (see Figure 1), thus inciting dialogue.

The fast paced, competitive logic of the game visibly precluded some desirable types of larger-scale reviews: restructuring presentations as a whole (such as to eliminate redundant slides), adding a large discussion of an important topic, or rewriting a slide from scratch. In future versions, these could remain outside of the game; alternatively, they could be formulated as a higher-risk, higher-level *mystery ticket* type, with judges deciding the variable sums of reward points. This solution could also productively and non-intrusively involve the more technically minded participants that would have rather worked without the game layer.

Despite these divergent logics, or maybe through the very process of solving them, instructors have experienced the “Revision Fever” exercise as an engaging learning situation: interesting errors became topics of debate and technical argumentation, including online searches for clarifying information (besides humorous comments that led to the formulation of a “funniest errors” top). As a tentative evaluation of the learning climate, we reckon that the “error-spotting” frame, the fast pace and the competitive logic induced a lively atmosphere in which controversies had a sharper contour, and individual learning experiences were, subjectively, more noticeable. One junior instructor mentioned that she learned a lot by seeing that “it’s not like

that, it's the very opposite"; a senior instructor saw the exercise as a collective "debunking of technological myths in our presentations". The gamification artifact helped shape the revision work into a learning situation.

Table 1. Examples of adjustment types in "Revision Fever"

	Gameplay	Divergence between game and activity
Instrumentalization (artifact change): The game layer	-Balancing elements (game market goods and prices, number of judges) -New mechanics (auctions in 2 nd session)	-New rules (teams implement corrections) -Balancing elements (changing ticket types; two initial computers per team)
	-Changing the structure of the error ticket to include a distinctive field for the proposed correction (in 2 nd session)	-Adjusting the game space (tables, chairs) -Adding software (Dropbox)
The accessory set		
Instrumentation (user scheme adjustment)	-Evolving play styles: selective options for observing vs. bending rules, cheating, and sanctioning others' apparent cheating; opting for a more competitive (even aggressive) or collaborative style, a more gameful vs. playful style etc	-Evolving styles of engaging with the game: total engagement versus half-engagement; -Evolving styles of including de-facto non-players in the game: separate non-game tasks; specialized game tasks that do not require full engagement (mystery tickets)

Conclusions

Gamification is often discussed as a potential source of intrinsic motivation and fun. More than that, it can contribute to *structuring an activity* - inviting an attention focus, speed and rhythm, communication flows, and by creating "story-tellable" events with memorable contours. Even more, game design may stimulate unusual social interaction, reversing relations of authority (for example, by seating on the same chair a junior and a senior instructor) and affording interaction beyond usual peer groups. Thus, gamification can be an *effective facilitator of learning*. At the same time, it raises specific *challenges*: gameplay may be limping, unbalanced, and the game objective, rules, pace or style of interaction can impede the main activity goals. Last but not least, some participants may feel alienated, if not outright uncomfortable – especially when discomfort is part of the game, as in our case study.

We have witnessed significant adaptations introduced by participants during gameplay and in-between sessions, with more or less anticipation of what they would lead to. *Instrumentalization* processes involve both the game layer elements, and the accessory set. *Instrumentation* occurs when participants' play styles evolve, and also when players' engagement with the game is attuned to the task at hand. Users resort to ignoring, bending, or cheating on game rules to adjust their schemes for carrying through the gamified activity. One local solution to the issue of game vs. activity divergence consists in developing a *style of half-engagement with the game layer*: players enter and leave the game-world continuously, following the demands of the main activity; some participate only nominally throughout the entire session of play. Gamification evolves as an instrument through its actual use; these adjustment processes contribute to a stimulative learning situation.

Endnotes

- (1) <http://trac.edgewall.org>
- (2) <https://www.dropbox.com>

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