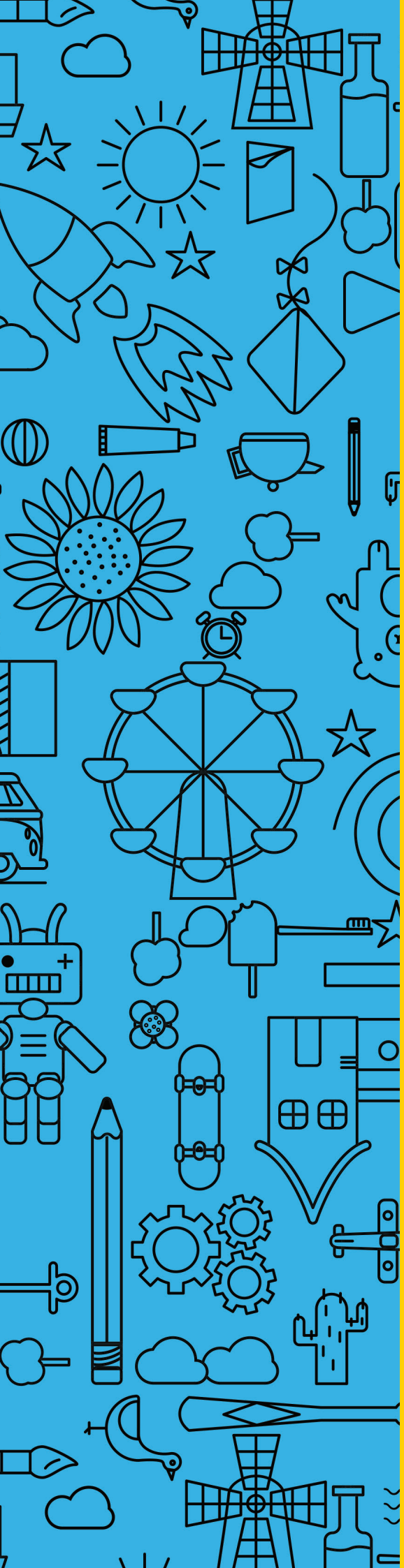

Gamification

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Introduction

First language learning is a natural human process for very young human children in the presence of language users and sufficient language data. Second language learning, sadly, is not so straightforward. In addition to exposure to language users and language data, second language learners work best with structure and scaffolding and need a reason to make the effort and persist – motivation for time on task.

Educators and others have looked at the appeal that games have to induce "flow," engagement so deep that time seems to stand still while hours pass. Game designers deliberately incorporate elements – mechanics, dynamics, and emotional appeal – to encourage motivation, time spent in the game, and the sense of flow. Research in business and now in education is exploring how to incorporate game elements in order to create the same intensity of interest in areas that are not games, hence "gamification."

Nick Pellin first used the term "gamification" in 2002 to describe a game-like interface that would make commercial transactions fast and fun. As he notes, he was about 10 years too early. Since its broader use began in 2010, "gamification" has been an increasingly common topic in a range of areas, with gamification of learning increasing in Google searches from 2011 on (Google Trends, 2018). The simplest and most widely-used definition of gamification is "*The use of game elements in non-game contexts*." However, a number of other researchers and writers prefer the term "gameful design" because of its focus on thoughtful design that uses game elements (e.g., Deterding, Khaled, Nacke, & Dixon, 2011; McGonigal, 2011; Bell, 2017). This paper will use "gamification" as the more common term while keeping in mind the central element of design.

The paper will begin with defining games and describing types of games used in education, then describe fundamental elements of gamification. Approaches, psychological underpinnings, and research will offer a deeper understanding, concluding with the current state of the art in gameful design in education.

What is a game?

Educators have long used games in teaching, so it may be useful to examine a definition of games, then some common types of games for teaching and learning in order to contrast them with gamification. According to noted computer game creator Jane McGonigal, "*all games share four defining traits: a goal, rules, a feedback system, and voluntary participation*" (2011: 21). Koster, cited in Kapp, describes a game as "*a system in which players engage in an abstract challenge, defined by rules, interactivity, and feedback, that results in a quantifiable outcome often eliciting an emotional reaction*" (Kapp, 2012: 7). So fundamentally, games have a challenge of some sort, rules that people choose to follow, feedback and interaction, plus an emotional reaction, generally that the game is fun. Players get caught up in a game. Without voluntary participation, it is work. With fun and without rules, it counts as "play," not a game.

McGonigal also talks about "*hard fun*" (2011:32). Challenging games such as chess are hard fun. These can give players a sense of mastery when they succeed. Simple games that are easy and that everyone can play successfully are good occasionally and for short times; the fun does not last if the game is too easy.

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Games for learning

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"Serious games" are designed for something more than entertainment, such as learning concepts or skill-based training. Educational games are serious games. Concentration using words and definitions, an arcade game where players need to shoot the letters in alphabetical order, and spelling bees are all educational games. Learning the vocabulary, order of the alphabet, or spelling all make winning the game easier. Players generally focus on the extrinsic motivation of winning, not on intrinsic motivation in learning. However, the game makes repeated practice much more enjoyable than simple rote learning.

Most serious games, including simulations, are far more complex than the examples above of concentration and arcade games for education. They generally have a story that provides the background and motivation for learning. A classic example is Civilization, originally created in 1991 as a simple computer game. Players need to try to

create a long-lasting empire by balancing revenue and expenses on a large scale. The game still exists, now in multi-player form. Another current video-game style example is Stop Disasters, from the United Nations Office for Disaster Risk Reduction (http://www.stopdisastersgame.org/), where players have to make choices in order to deal with a variety of natural disasters such as a tsunami, wildfire, or earthquake. Players learn about risks, plan ways to build in order to reduce risk, and see the effects of their work when disaster strikes. Gamelearn (n.d.) mentions Dragon Box Elements as a video game where players need to learn geometry to save Euclid's island, Pulse! where nurses can practice emergency room decision-making, and Pacific, where team-building techniques are required in order to escape from an island in the middle of the Pacific Ocean. All of these can also be used in language teaching, since they create a reason to collaborate when played in teams and communicate.

"Game-based learning" uses a serious game extensively to achieve an educational purpose. In education, a course unit could be based on a serious game such as Civilization, with ancillary material and attention to the learning coming from the game. Language teachers have used Minecraft, a game where players can collaborate to construct a virtual world using blocks, for individual, pair, and group work. York (2014) describes ways to use Minecraft's creative, adventure, and survival modes to build a variety of language skills. The game is a central part of the activity in game-based learning rather than an occasional supplement.

Fundamental elements of gamification

... The most commonly used elements in gamification in all areas are mechanics: points, badges, and levels.

Deterding, Dixon, Khaled & Nacke (2011) carefully define gamification as the use of design elements characteristic for games in non-game concepts. They explain the difference between gamification, games, serious games, and play as follows: Gamification refers to the use of design elements characteristic for games in non-game contexts. The definition talks about games as opposed to play. For the authors, games have characteristics that don't apply to general play, for example, competitive elements and clearly defined rules. The definition focuses on elements of games. Sometimes complete games are used in non-entertainment contexts, the authors see this as distinct from gamification. Gamification uses elements, not the whole game. The definition also focuses on the way games are designed and not on the use of specific game technologies or practices. Gamification focuses more on design features of games such as badges, levels and leaderboards, which we will examine in more depth later in this paper.

Fundamental elements of gamification (cont.)

Hunicke, LeBlanc, & Zubek (2004) describe three basic principles of gamification as mechanics (goals, rules, rewards), dynamics (player response to mechanics), and emotions (how players feel about the experience), referred to as MDA. The most commonly used elements in gamification in all areas are mechanics: points, badges, and levels. These are part of a reward system with feedback (immediate, if possible) designed to provide positive reinforcement for performing step-by-step tasks and progressive challenges — following the rules, in other words. Leaderboards that list highest point-getters reward success. Competition is a frequently-used dynamic, and leaderboards or other ways of publicly sharing badges and levels can encourage competition. Teamwork or other forms of collaboration can promote a different dynamic from competition. The gamified experience should feel fun and appeal to learners on an emotional level. Many gamified environments use storytelling to appeal to emotions. Design can aim for certain dynamics and emotions, but those are both player responses that will vary according to the individual.

Yu-Kai Chou (2014) uses an eight-step approach called "*octalysis*" to describe a framework for "*human-focused design*," his preferred term for gamification. As he says, "*Gamification is the craft of deriving all the fun and engaging elements found in games and applying them to real-world or productive activities. This process is what I call 'Human-Focused Design,' as opposed to 'Function-Focused Design.' It's a design process that optimizes for human motivation in a system, as opposed to pure efficiency.*" He identifies eight core drives in human motivation:

1. Accomplishment
2. Meaning
3. Empowerment
4. Ownership
5. Social Influence
6. Scarcity
7. Unpredictability
8. Avoidance

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A graphic that includes all of the game mechanics for each drive is available at https://yukaichou.com/gamification-examples/octalysis-complete-gamification-framework/.

Elements 1, 2 and 3 are positive motivators. Elements 6, 7 and 8 are negative motivators. Ownership and Social influence can be positive or negative. Good design should take all eight motivators into account.

Chou's model can help designers envision the elements to include in their gamified experience for any discipline or target market. Huang & Soman (2013) look specifically at education and offer a 5-step model for gamifying instruction:

1. Understand the target audience and the context.
2. Define learning objectives.
3. Structure the experience.
4. Identify resources.
5. Apply gamification elements.

The first two steps are basic to any educational design. Structuring the experience includes creating the stages and milestones, which may each have their own learning objectives. In order to be able to gamify one or more of the previously-identified stages, the designer has to identify resources. This includes finding tracking mechanisms, setting up the currency (the unit of measurement, such as points), determining levels and how to meet them, setting clear rules for what learners can and cannot do in the environment, and establishing feedback that shows learner progress. Gamification elements are personal/self-elements (badges, levels, time constraints) and social (competition, cooperation, sharing achievements). Huang & Soman feel that a "mindful approach" using these five elements can help lead to a successful gamification strategy.

The psychology of gamification

Gamification is based in large part on encouraging motivation. Intrinsic motivation is the desire to perform an action, such as learning content, for its own sake. Extrinsic motivation, on the other hand, is responding for a specific, expected reward. A psychological rationale for the power of intrinsic and extrinsic motivation comes from self-determination theory (SDT), proposed by Deci & Ryan (1985a, b). SDT links motivation to behavior, referring to three basic needs: autonomy, or the feeling of being in control; competence, or the sense of building skills and developing mastery; and relatedness, or connection to others. These elements can also be found in Chou's Octalysis framework as seen in the previous chapter.

According to Deci & Ryan (1985a), the effect of game mechanics on motivation depends on how players ascribe meaning or "functional significance" to the environmental stimuli. Deci, Koestner, & Ryan (2001) describe this subset of SDT as cognitive evaluation theory, which incorporates an individual's perceptions of events. External events, motivators, and environments that increase a sense of autonomy and competence can increase intrinsic motivation. If the events or environments seem to be controlling, then intrinsic motivation decreases. For example, positive feedback that feels authentic is good; feedback, even if positive, that seems to be designed to control behavior has a negative effect (Deci, Koestner, & Ryan, 2001).

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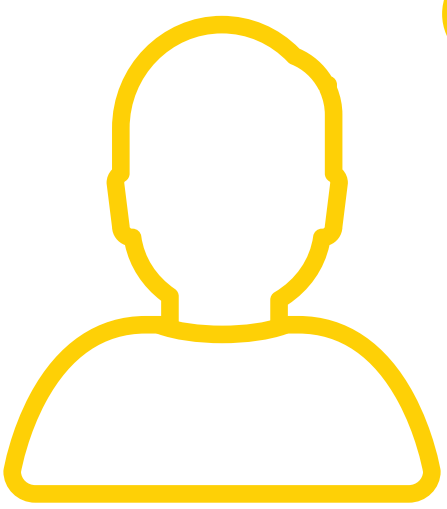
Research on gamification



Research on gamification in education has matured over time from simple surveys of attitudes, generally but not exclusively positive, to a more nuanced view of the way that design affects outcomes for different people. A literature review of gamification studies mostly in higher education by Dicheva, Dechev, Agre, & Angelova (2015) found that most of the papers they reviewed showed encouraging results. Positive results were found in terms of higher engagement in learning activities, increased attendance, and minimizing the difference between the highest and lowest scorers. Studies with mixed results seemed to miss critical motivational elements or were poorly implemented due to lack of educator time and interaction with learners.

Much of the current research explores motivation, including willingness to engage and persistence to achieve time on task, and efficacy of gamified interventions. A crucial issue

relates to intrinsic versus extrinsic motivation. The psychological research mentioned above indicates that a focus on extrinsic motivation with rewards, whether points or grades, can have a negative effect on performance once the reward is reduced or eliminated. Intrinsic motivation can grow from extrinsic, but it is not guaranteed. Deci, Koestner, & Ryan point out that "Although tangible rewards may control immediate behaviors, they have negative consequences for subsequent interest, persistence, and preference for challenge, especially for children" (2001:10). In their study, Abramovich, Schunn, & Higashi hypothesize that "If learners interpret badges as external rewards, then they could possibly lower a student's motivation to learn or cause the student to focus on earning badges to the exclusion of the learning goals" (2013: 218). They found a difference between the type of badge and the type of learner, where participation badges but not skill badges improved motivation for low-performing learners. High performers were motivated by skill badges, and the more badges they had, the more they expected to succeed.

Most of the research on gamification in education has been focused on university students, but a few studies have had children as their focus. Homer, Hew, & Tan (2018) found positive effects on children using the gamification platform Class Dojo for oral skills classes in grades 3 and 4 compared to students using traditional classroom rewards. Students in the gamified classes did significantly better on pre- and post-tests. Teachers in the study responded that more of the class participated and tried harder with Class Dojo than with a traditional classroom rewards system. Teachers said that even students who were not enthusiastic about badges felt peer pressure to work harder to keep up. However, their study of children in first and second grade reading/vocabulary classes showed no significant difference in pre- and post-test results. The first and second graders did report that they enjoyed using Class Dojo and felt it helped them work harder (Homer, et al., 2018). The study by Abramovich, Schunn, & Higashi (2013) cited above was with 7th and 8th grade math students, where effectiveness of gamification varied with the type of badge and learner. Jagušt, Botički, & So (2018) researched three configurations of gamification: competitive, collaborative and adaptive, for 2nd and 3rd grade math students. The adaptive condition used a narrative (competing against a virus to solve problems) and an individually adaptive algorithm that shortened the time to solve each problem with each correct answer. They found the adaptive condition worked best to sustain student performance and had the best increase in performance. Compared with a non-gamified class, all three gamified conditions did better in terms of the number of problems solved.

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Conclusion: Current state of the art

Gamification has shown that it can be a valuable addition to designing effective learning. Students tend to like it, and in certain circumstances, it can motivate and improve learner performance. The key is in the way that gameful design – gamification – is incorporated into a lesson or a class. Seaborn & Fels (2014) surveyed a range of studies and conclude that "*success might be improved across the board if the design of gamified systems, especially extrinsic motivators, is informed by end-users' intrinsic motivators. ... User-centered design methodology may help elucidate intrinsic motivators for a given user population. There may not be an ideal gamified system - an optimal combination of game elements, mechanics, and dynamics that always works - instead, gamified systems may need to be selectively designed given the individual makeup of the end-user population or even designed flexibly and inclusively, allowing for personalization and customization, to accommodate individual users*" (2014: 28)

Similarly, in their overview, Dicheva et al. (2015) conclude that "*finding and sharing of new ways of applying gamification to learning contexts that are not limited to extrinsic rewards like achievements and badges and that are more meaningful to the students is very important for increasing the application of this emerging technology in education. While the concept of gamification may look simple, the analyzed work demonstrates that gamifying learning effectively is not*" (2015: 84).

As Chris Jones put it in the title of his 1989 paper, "*It's not so much the program, more what you do with it.*" This is still true. Just adding a few game elements will not necessarily result in better language learning. Instead, teachers can use knowledge about their students and their context plus insights from psychology, research, and game designers to create a meaningful and effective gamified learning environment.

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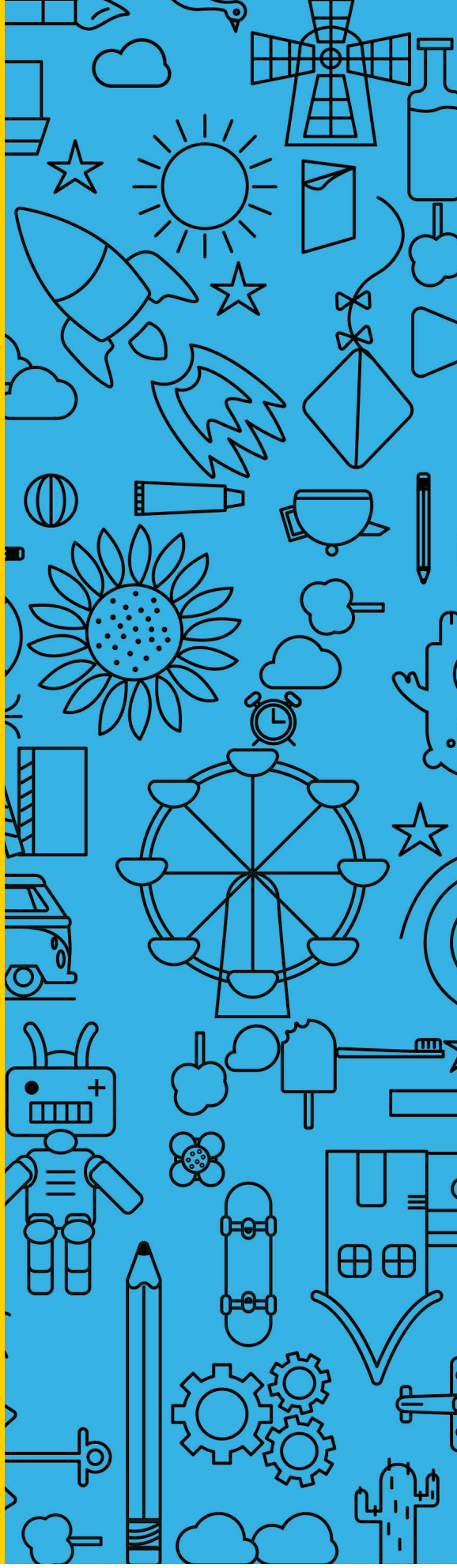

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