Designing Games as Playable Concepts: Five Design Values for Tiny Embedded Educational Games

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ABSTRACT

Digital games transform our lives; they provide an opportunity to engage with other worlds in a playful way, in many ways similarly to what other forms of audio-visual communication (like movies, paintings or photos) have offered for a longer time. However, learning materials still use rather traditional ways for accompanying media, ranging from static figures and graphs to videos and animations. In this paper, we explore the notion of *Playable Concepts*: tiny games that are embedded as part of educational material instead of separate and standalone products. We argue that games could be in a similar role as static graphical elements in educational and communicational material, embedded in the text, together with other media formats. We suggest that the design space of *Playable Concepts* can be framed with five distinct design values: *Value of Partiality, Value of Embeddedness, Value of Simplicity and Immediacy*, and *Value of Reusability*.

Keywords

Game design; educational games; playable concepts

INTRODUCTION

Digital games have become a pervasive part of everyday life through the normalization of digital play (Kultima 2009). For the past decades, the expansion of the *ludosphere* (Stenros and Kultima 2018) has created an abundance of games and playful environments for entertainment, social interaction, as well as learning and expression. Games are everywhere: not only in the living rooms of game enthusiasts but also on the mobile devices of the masses.

Games are played by vast numbers of players and demographics. For instance in Finland, 98% of the population plays some kind of games and 60% play digital games at least once a month (Kinnunen et al. 2018). Games have become a common form of entertainment of the 21st century.

In cultural veins, games have conquered a wide ground, blending in with practices and everyday life in various ways. They are referenced within other forms of popular culture, for instance in tv-shows, movies, books, and songs, and have become part of the intertextual landscape. Games are a diverse form of expression, basis for varied businesses, domain for different hobbies, cornerstones for rich communities, and seminal for many modern cultural and art experiences — "games can be many" (Kultima 2018, p. 6). However, it

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seems that we still see games through specific lenses, host various implicit assumptions tied to early examples, and dominantly evaluate game design through a limited set of design values (Kultima and Sandovar 2016).

In a way, we treat games predominantly as standalone artifacts, separated from their contexts or other forms of media (Aarseth 2001; Juul 2005; Mäyrä 2008). Even among game scholars, the model of games as specialized software (mostly) running on specialized hardware, affects the discourse. These implicit assumptions, among others, stemming from the formative years of (digital) games research, can lead us to treat even popular forms of games and play as exceptions. For instance, the academic models might not account for, or explain, phenomena in analog games, larps, or even mobile games. Our models for games and play are limited and historical.

Furthermore, it seems that we treat games as software that players engage with only in order to get the full intended experiences (Kultima and Stenros 2010). Despite the diversity in technologies games employ, or forms of play that these works of arts might afford, one dominant view in game design education is to teach students to create games that fully stand on their own. It is emphasized, that games are played as immersed on single devices and apart from the makers as the game designers do not come with the box (Fullerton 2018). From this emphasis, it is considered vital to make sure that the user experience is seamless, even for the inexperienced players playing the game alone. In this article, however, we would like to challenge these assumptions in response to challenges in designing educational games.

CHALLENGES IN EDUCATIONAL GAME PRODUCTION

While games get most of their popular attention as frivolous entertainment, they are also seen as a great medium to facilitate engaging learning processes on cognitive, motivation, affective, and sociocultural levels, in ways that other media cannot (Plass et al. 2015). Educational games and the sector of games for learning, therefore, has been equally growing and maturing alongside the rest of the *ludosphere*.

However, while the entertainment-centric games are considered open for design opportunism (Kultima 2018), game productions aiming for specific learning outcomes often face challenges in their production realities. In some cases, the productions are under-resourced, and thus fail in their design resulting in products with poor execution in comparison to games aiming for entertainment (Perry 2018). Even when the game creates playful experiences well, teachers face practical challenges in using them in teaching, including how to contextualize the game in the taught subject matter. This is due to the "games not being sufficiently accommodating for the needs of teachers or the many characteristics an educational context may have" (Marklund and Alklind Taylor 2016, p. 134). Then on the other end, sometimes educational games are created by teams that might hold expertise in pedagogy and school subject domain, but lack expertise in game design, production and technology. When the design goals are not flexible, the demand of resources and design experience can be higher (Kultima 2018), especially if the design processes and design goals are modeled after the big popular commercial games. Educational games have distinct markets and cannot always adopt economic sustainability, leaving educational game companies and design teams struggling in the generation of substantial amounts of revenue to sustain themselves (Mayo 2009). Long production processes of educational games also run the risk that the

game will become out-dated quickly, and no longer afford the flexibility required when the classroom environment and curriculum changes. These factors lead to narrower production possibilities for educational games, as well as the problems of sustainability and scalability of the educational game industry.

But we believe that the solution is out there, with the help of "tiny" game making tools. While large-scale budgeted games are still created using complex tools, a number of alternative tools for game-makers, with lower entry points, have been developed in recent years. Some of these "tiny" game making tools such as Bitsy, Construct 3, Game Maker, Scratch, Twine, and Stencyl, have become popular within game jams, hobbyist communities, as well as in classroom activities. Tools like these make game making available to non-professionals, and using them, anyone can become a game creator in a matter of hours or days. Even though these games would not match the competition of blockbuster games, they scale well with the limited production resources.

Whilst success in commercial game development typically requires experienced teams and extensive funding – not to mention resources in user acquisition and marketing – successful educational material practices do not necessarily have to match these expectations. Even though capturing the attention of the players with polished game products and retaining them with pleasurable experiences would be ideal, in many cases these demands bring an unnecessary burden to educational game production. To avoid this burden, we need to purposefully seek out *alternative lenses* — different design models — for design examples better suited to this production reality.

ALTERNATIVE LENSES FOR EDUCATIONAL GAMES

We argue that games are blending, and could be blended even more with other means of communication. There is no reason to treat games as special and isolated from other media. They could be in similar intertwined roles that text, pictures, moving images, and for instance audio have in our modern communication. Such blending is already happening, even though the discourses on games still draw from the archetypes of video games. In this article, we are especially interested in how games could be treated as words, concepts, images or "ludic atoms" as part of a mixed media format for education. With this atomistic approach, we are seeking an alternative path for designing game-based learning experiences.

In order to build our framework, we have selected interesting games and phenomena to analyse, and highlight as alternative lenses. Some existing games and projects, such as *Gravitation, Loneliness,* (Rohrer 2008; Magnuson 2011) and Explorable Explanations (Case 2014) have been our primary inspiration for the formation of our alternative path. Additionally, our framework has been driven by years of observation within the game industry and game making communities (see Kultima 2018).

The examples and lenses that we provide in this article are not the only alternative paths, but have been central for us in challenging our implicit design views and building a set of design values to guide our future projects. We have explored lowered expectations in the scale of games, visual fidelity, the ethos of gamification, situating games as parallels with illustrations, and the evolving world of information visualization.

Small Educational Games

When we develop games, especially educational games, the aim or dream can appear to be to create a game that on its own empties a concept to the player. In essence, a game that is a lesson in a chosen subject, that will replace teaching. Placing the burden of communication solely on the educational game puts a lot of pressure in terms of expectations on the production of the game. It requires game creators to become – or consult – teachers and pedagogues to make sure the game works for the curriculum. The game's use cases become increasingly narrow as the specificity of educational content increases. The production costs increase as well in an effort to make sure the game is both a good game, and a good learning tool.

The struggle to marry these two goals has been the focus of a lot of research in learning games and in game-based learning (Marklund 2014). Could we abandon both of these goals in favour of something else? By abandoning the goals of creating a game that is as engaging as a commercial video game, whilst being filled with educational content, we can start considering use cases for small educational games as communicative atoms.

It is important to acknowledge that the educational game research community already recognizes a difference between educational full games and educational mini-games (Prensky 2008). While game-based learning research primarily focuses on the motivational power of and engagement in games, we could shift those focuses more on the communicative possibilities,and how games can bridge the understanding gap of education, as proposed already by Gee (Gee 2007). An educational mini-game, designed to let the player explore a single concept or phenomena in a concise but explorative manner, already takes away a lot of the production costs associated with creating educational games that aspire to be as engaging, immersive and polished as many complex commercial, multimillion production videogames are. The educational mini-game can be shorter, and address very specific subjects.

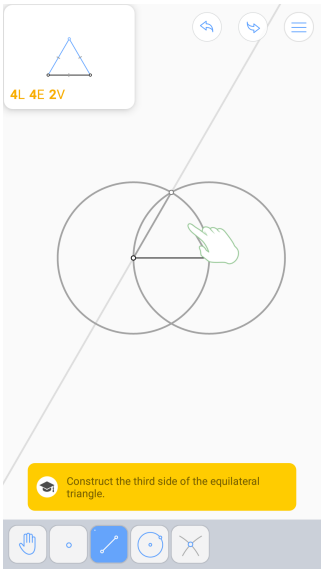

Figure 1: Construction of equilateral triangle in *Euclidea*

The tutorial level of the mobile geometry game Euclidea (Horis International Limited 2014) (see Figure 1), poses the player with the challenge of creating a precise equilateral triangle

using circles and lines. While the game does not explicitly teach the axioms of euclidean geometry, the player explores them through gameplay centered on euclidean constructions. While these to the uninitiated may seem to be fairly abstract, specialized concepts in geometry, a deeper, practical understanding of the principles of euclidean constructions is very helpful for understanding the concept of an equilateral triangle in general beyond abstract rule sets or arbitrary convention. However, this understanding of how the teaching of the game applies outside it doesn't need to be conveyed by the educational game alone.

Illanas et al explore educational conceptual mini-games, in which games that focused on a certain concept to teach were created. According to Illanas et al, the benefits of creating conceptual mini-games were the low cost, quick production, and they were a highly reusable and accessible learning tool (Illanas Vila et al. 2008). In the Smiley framework, again, learners and educators were invited to create their own small educational games (Weitze 2016), and learners creating their own educational games is the basis of many constructionist game pedagogies for the classroom (Kafai and Burke 2015).

By taking the form of small educational games, the games do not need to take on the full burden of communication in the classroom. Instead, since the game is part of an educational material, curated by a teacher or pedagogue, it can be given partial responsibility for communication. With this approach that embraces smaller games as part of communication, we can also improve the practical realities of classroom integration of games — such as the demand of technical know-how and maintenance time that conducting game-based projects can require (Marklund and Alklind Taylor 2016) — by designing for a specific, small, embedded, use case; perhaps even by teachers themselves.

Games with Minimal Visual Elements

Commercial games are often very ambitious visually. Such high production value takes a lot of time, resources and experience to achieve. However, many stylized or minimal games have had great success and succeed in capturing the player's attention efficiently. The game does not necessarily have to be limited to a certain minimal theme, such as pixelated art style, but could be abstracted enough to invite the players to interpret the meaning, and thus open up the domain for the player to quickly adopt the rules, critically explore and interpret the system, and then reuse the system to create new meaning through their lenses.

Abstract games refer to games that primarily operate in the symbolic mode, containing game objects (not signs in the game's fiction), rules and fiction, while inviting the player to interpret the metaphor within the game by playing it — as Begy argues, through experiential metaphor (Begy 2011). The games *Passage* (Rohrer 2007) and *Gravitation* (Rohrer 2008), created by game designer Jason Rohrer, are constructed around abstracted and pixelated visuals that showcase only a few simple attributes of the characters and the surrounding objects; figure, gender, color, as such. The games do not directly tell the players its goal, but rather invites the players to explore the rules and mechanics while playing the game and communicate dynamically to the player (see Figure 2). Rohrer's work demonstrates the notion that games can successfully deliver their messages by producing emotions to the player with minimalistic aesthetics (Blow 2008; Nealen et al. 2011).

We acknowledge abstract games are not only a contemporary phenomenon that is distinct from modern days digital games, but already existed in early days when the processing

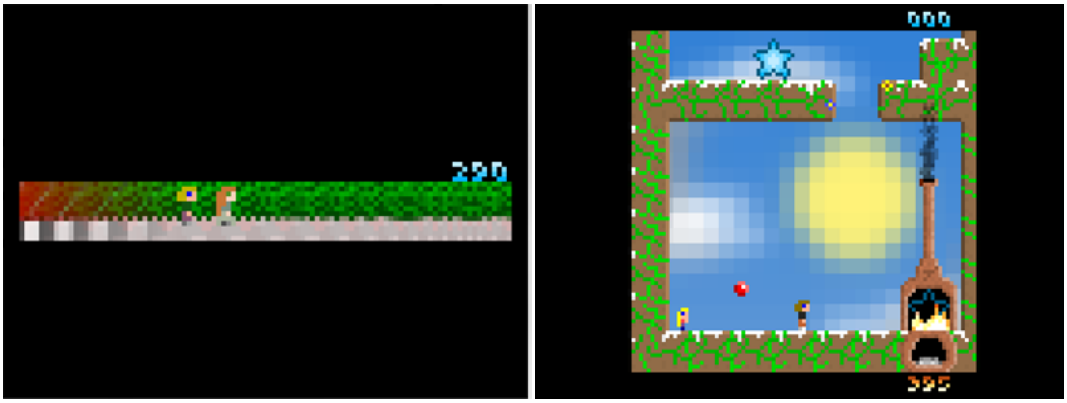

Figure 2: Gameplay screen of *Passage* (left) and *Gravitation* (right)

power was not strong enough to display characters and stories, such as *Space Invaders*. Game designers have already demonstrated that games can be designed with that intention without the necessity of vibrant visual assets. As Järvinen described, games are already the "systems which facilitate 'safe' planning towards goals," and thus "produce various eliciting conditions for emotions" (Järvinen 2008, p. 130). In the Necessary Games project, the game designer Jordan Magnuson demonstrated several cases of minimalistic games that each create a specific type of emotion to the player. The game *Loneliness* for example, of which Magnuson describes as "minimalistic microgame" (Magnuson 2011) the player is a square shape that is constantly being isolated from other non-player squares. The game's rules and mechanics construct negative and sorrowful emotion to the player despite the constraint of visual fidelity (see Figure 3).

Figure 3: Gameplay screen of *Loneliness*

One of the distinctive characteristics of digital games is that its interactivity often engages the players, and therefore, leads towards the attitude of active learning. It is not surprising, therefore, to find examples of abstracted minimal aesthetics in educational tools with playable game components. The projects from game developer Nicky Case and his web-based games with informative educational components are one of those examples, namely

Parable of the Polygons (Hart and Case 2017) from Explorable Explanations project (Case 2014) (see Figure 4). Case's project critically examines the real-world systems with little visual aesthetics and simple mechanics. The metaphorical and symbolic minimalistic style of Case's hub enhances the reusability of the work, encouraging others to use his game making hub that helps others construct interactive simulations.

By comparing games with the same game mechanics but with different graphical fidelity, Gerling et al. have concluded that the player experiences are indeed influenced by the graphics but only when it is integrated with game mechanics (Gerling et al. 2013). Andersen et al. examined a large scale study of how aesthetics – including music, sound, and animations – influence player behavior in casual games and noticed a minor gameplay modification affected player retention, more than aesthetic variations. This demonstrates that game mechanics and user interaction drives the learning – whereas graphical fidelity is also important, it is lower in priority (Andersen et al. 2011).

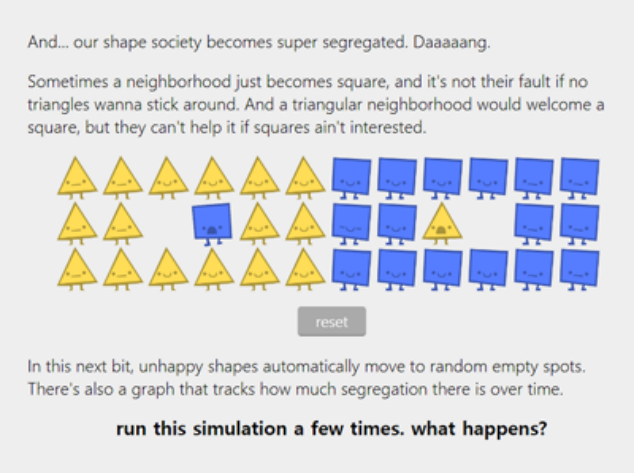

Figure 4: Screenshot of *Parable of the Polygons*

As such, game designers and educators have already explored the methods that successfully deliver their message and information to the player in a playful manner with minimalistic visual elements. This is an indication that the player engagement, motivation, and meaning-making is still significant despite abstracted visuals but even more so, encourages the player's interpretation and reusability of games for education, communication, and illustration. An educational game does not need to be, or perhaps, should not be modeled after the resource-hungry game productions that have been aiming to take the full advantages of computer graphics cards or specialized gaming hardware or attract the players by aiming to be at the forefront of visual cultures.

Gamification

The power of games can also be harnessed partially. In the past decades, we have seen an increasing number of cases of utilizing game-like elements in non-game environments, to acquire persuasion powers, gratification and other benefits of playful design. This is generally called gamification (Huotari and Hamari 2012; Deterding et al. 2011). There, the language and practices of game design are being borrowed and mixed with the practices and principles of service, business, experience, interaction, education, and other domains of design, to create engaging experiences. In the context of game-based learning, for example,

Plass, et al. have proposed the concept of *Playable Learning*, stating it as "an activity by the learner, aimed at the construction of a mental model (a coherent representation of the information in memory), that is designed to include one or more elements of games for the purpose of enhancing the learning process" (Plass et al. 2015, p. 278)

It is important to acknowledge that despite gamification cases are not full games, they can succeed in harnessing the power of playful engagement. Of course, gamification models are not safe from criticism (Majuri et al. 2018). But importantly, gamification pushes us to re-evaluate the need to model our design choices based on full games, and furthermore challenge the guiding principles and values of designing games for learning.

Interactive and Playful Information Visualizations

We can also seek lenses outside games, in the parallel worlds of other interactive media. Understanding what happens in the world, in our environment, organizations or society, can be greatly supported by data. Data are essentially observations by someone, or by some sensor, or by artificial intelligence. However, data needs to be handled in a way to discover usable information, and to communicate that information with an experience of immediacy. Information visualizations offer a wide toolbox — like the use of shapes, colors, animations — and their arrangement to convey what is happening in the world. It is the resulting narratives that support people to discover and understand the essentials of observations in a dataset (Segel and Heer 2010), to gain insight (Yi et al. 2008), and to provide explanations (Tufte 1997).

Even our everyday life produces data that calls to be visualized (Pousman et al. 2007), so that we can better understand ourselves and our actions. We argue that games can similarly serve as visualizations of concepts, like laws of physics, agile development in projects, cubism in art, as such. And thus help learners achieve their learning objectives. Information visualizations can also be designed to be interactive (Spence 2007) and playful, something that games are at their very core. The DATAPLAY project, for instance, bridges information visualization and games (Macklin et al. 2009). It is worth to mention that, similar to games, visual aesthetics also largely determines how an information visualization communicates, like about genomics (Krzywinski et al. 2009). The variety of forms and shapes in an information visualization enable to create meanings (Zhang 2007). As such we see there is a lot of parallelity between games and interactive information visualizations. So for example, what if instead of pictures, tables, and charts, we would use small embedded interactive games where different forms, shapes, events and game characters create meanings?

Games as Illustrations

Educational games could also be modeled for instance after some ideas from the long (and analog) history of illustrations and picturebooks. One framework proposed by Nikolajeva and Scott discerns five different dependency relations between visual narrative (illustrations) and verbal narrative (text) in picturebooks: *the symmetrical, the complementary, the expanding or enhancing, the counterpointing*, and *the sylleptic* (Nikolajeva and Scott 2006). Essentially, the visual and verbal narratives do not always tell the same story. The relation between these narratives falls on a spectrum between symmetrical, in which the verbal and visual create a mutual redundancy, and the sylleptic, in which they form completely independent narratives. Between these extremes, we find different degrees of dependency between visual and verbal. In the complementary, gaps in the narrative, that need closure, have been

left in either the verbal or visual, to be filled by the other. In enhancing and expanding, one supports or expands on the other. In the counterpointing relation, a mutual dependency is formed between verbal and visual narrative.

Inspired by this framework, we attempt to translate these into the language of games. Out of the five categories from Nikolajeva and Scott, the concepts of *symmetrical* and *complementary* are the most straightforward. Since games have the potential to express and illuminate quite different things than, for example, verbal texts, even these most straightforward relations are quite potent for educational or informative games.
In the *symmetrical* relation, both components are expressing the same meaning. In the case of educational material, it could mean; if the verbal text explains a concept, then that concept is translated into a game that expresses the same aspects of it as the verbal text. In the *complementary* relation, the game fills in the gaps in understanding left by the embedded context or vice versa. In the *expanding* or *enhancing* relation, either the game supports the meaning of verbal communication, or understanding verbal communication is dependent on the game. In this relation either the game or the embedded context is not quite independent of the other. Rather, the game adds to the understanding of the context or guides which possible interpretation is intended. This dependency can be taken a step further, to a *counterpointing* relation. In the counterpointing relation, the game and the embedded context form a harmony, mutually dependent on each other. Without playing the game, the meaning of the embedded context is incomplete, and without understanding the context, the game doesn't make sense. Finally, in the *sylleptic* relation, both the game and the embedded context create independent meanings.

Nikolajeva and Scott also talk about *ironic* relations, where the visual and verbal can even *contradict* each other. The irony, or contradiction, between the game and the context proposes some interesting new avenues for the field of educational games as well. One such way could be the intentional repurposing of existing games through recontextualization. An educator can retitle a game such as *Space Invaders* (Nishikado 1978) into *Love?*, for example, creating an invitation for new interpretation. What does it say about love to be able to fend off invaders with a turret? What's the symbolism of the red spaceship, of your defenses slowly breaking down as waves of aliens approach? The students could create their own interpretations, and attempt to solve the metaphorical use of game mechanics while reflecting on whether or not *Space Invaders* is a game that explains the concept of love, and what would be necessary to make the simile stronger. Also other theories of illustrations could bring us similar challenging power of seeing games in a less typical role.
These five alternative design examples – small educational games, minimal visual elements, gamification, playful information visualizations, and potential use of game as illustrations — each showcase interesting and different paths for alternative models for educational games and game design precedents, which would not carry typical burdens of production realities. In a way, this can also mean a normalization of educational game making, as less fascinating and hyped, instead placing it closer to the realities of educational practices. In the next section, we bring our selected phenomena together to form a specific design space, manifested by five game design values of designing games as *Playable Concepts*.

DESIGNING GAMES AS PLAYABLE CONCEPTS

We call for games that work together with other forms of communication elements, instead of them being standalone and isolated products. We announce these games as *Playable*

Concepts: games that can be treated as words, images or ludic atoms and used as part of a communicational whole. Our motivation for exploring the design space of *Playable Concepts* has been twofold: 1) we seek to bring games outside their common contexts by giving them a newly focused (partial) role, and 2) improve the production sustainability of making games for utilitarian purposes.

We want to clarify that *Playable Concepts* are not just gamified illustrations, small games, games with minimal visuals nor a branch of interactive infographics. Instead *Playable Concepts* are indeed games with their own standpoint sharing special design traits and production trade-offs, which are covered in this chapter. They also propose a design reality where more can be achieved with less resources.

Five Design Values of Playable Concepts

For *Playable Concepts*, we highlight five design values derived from our observations and example cases: *Value of Partiality, Value of Embeddedness, Value of Simplicity and Immediacy*, and *Value of Reusability*.

It is important to emphasize that what we refer to as design values, are not equal to societal values. Instead the design values can be all kinds of principles, beliefs and appreciation systems that practitioners have, and which affect their design decisions throughout the design processes (Holm 2006). It is typical that these values may not always be reflected upon directly, but they do tend to affect below the surface. Understanding the role of design values can help in solving design frictions and shaping new paths.

Furthermore, *game design values* are what shapes the work of game makers, by affecting their beliefs of what a good game is and what to prioritize when making design decisions in game production. There is no neutrality in making games either, nor a single value which all game making can be reduced to (Kultima and Sandovar 2016). We believe that certain struggles of the field of educational games are rooted in following guidelines of game design that do not always serve the intended purposes. Thus it is important to examine alternative design paths at the level of design values.

Value of Partiality

Instead of aiming for fully standalone artefacts, games as *Playable Concept* are partial. They are not aiming to be complete, self-sustaining or self-explanatory games. They may lack tutorial, menus, framing narrative, or other features that can be considered critical to standalone products that have to contain everything within a single software, app or work of art. A Playable Concept game can be included as part of a bigger whole — similar to words in a text where the reading experience is only meaningful when a full sentence is read. In this sense, games as *Playable Concepts* don't carry the full burden of communication but instead can bring the elements from external materials to make sense of the game experience — to frame the interaction between the game and the player and guide the player in their meaning-making. Partiality as a design principle challenges the gameplay-centric game design that is similar to the rise of casual games (Kultima 2009) — broadening the design domain so that it covers, or in this case utilizes, also other parts of the overall media experience.

Value of Embeddedness

Games as *Playable Concepts* are designed with an assumption that they are embedded within something other than games. This can mean, for instance, embedding a game on a website

in the middle of text. For example with HTML5-games, popularly published on web-based platforms (such as itch.io) that afford tools for embedding the game pieces directly in a web-page. Many popular game engines and game-making tools nowadays also support game sharing features and integration solutions between these web-based platforms, while some digital file formats allow for interactive components. Embeddedness could also mean that the games are used as part of a presentation, explained and framed by someone while they are played — embedded in a non-technological sense. Embeddedness also affords the partiality of the gameplay design, as the *Playable Concepts* doesn't carry the same burden of communication and is not designed to be used as a standalone piece. In that sense, a *Playable Concepts* embedded within its context can be treated similar to (but not necessarily equalized to) illustration or visualization.

Value of Simplicity and Immediacy

Instead of complex design and framing of the play session (within the game), games designed as *Playable Concepts* favor a significantly simple design and offer immediate experiences, potentially designed for a limited part of a screen. They can also aim for abstract or minimal visual elements instead of visual fidelity and details. A Playable Concept game needs only what is necessary for communicating a single concept and leaves all extra out so that it is immediately interactable and potentially designed for short play sessions. This favors quick to start single screen gameplay designs, limited game mechanics or controls, as well as a lack of narrative or textual elements. Such design principles resemble the design of casual games, abstract games and the recent phenomenon of hyper-casual games, as well as interactive information visualizations. However, even though abstract and minimalist game elements can seem to be produced with less production resources, the relation to lowering production costs is not necessarily linear. To create efficient abstractions or minimalist representations requires design skills, and simplicity can even push for longer development time especially if a game needs to convey a specific message or emotion. When successful, the minimalism in a game created as *Playable Concepts* can come with the added challenge or benefit of inviting the player to interpret the meaning.

Value of Reusability

Games that are framed as *Playable Concepts* are valuable also through their modifiability and reusability. This can afford a Playable Concept game's design to be reused or modified by other creators. Conventional and repetitive designs can ease their making, as well as their interpretation and use. These games do not have the same burden of uniqueness that is often the case of profitable commercialization, and games as standalone game products. It is more important to afford sustainable production, which often is a difficult production challenge that educational games face. Modifiability and openness to reuse of design allows a formation of networks of creators, in which one original game can be created by more experienced professionals, then allowing future game-makers to modify those games by using game-making tools for hobbyists with lower entry-levels. As examples, the online communities of Scratch (MIT Media Lab 2019) and OpenProcessing.org (Wiredpieces Inc. 2008) allow users to peek inside each others' projects, modify them, and share their own versions.

DISCUSSION

The design space highlighted with our set of design values is not as such new or unique. In a way the phenomenon of *Playable Concepts* already exist within the ever-growing ludosphere. There are many games that are simple in their visual or gameplay design, and

they are immediate and accessible as well as embedded or even partial. These latter two are more rare than the former two: some games might be embedded for instance within other games, and the practice of using games within educational contexts are in essence about embedding and partial, yet it is rare to see games specifically designed for a partial role or that they would be embedded for instance in articles and used instead of static figures or videos. Perhaps this is still seen as unattainable due to technical obstacles and lack of game making skills.

As we have already argued, game making has become increasingly accessible art practice for the masses during the past decade. The development and accessibility of a wide variety of game making tools, as well as the abundance of (even free) educational material, has resulted in that games are made by, not only a growing body of game professionals but also hobbyists and professionals from different fields and domains. The availability of tools in combination with rising levels of game literacy has made the making of small and simple games less resource-hungry. What used to be the threshold for making games, is not a dividing factor anymore.

These developments, however, are not widely known. Despite that games have become part of our everyday lives as common forms of entertainment, we still lack praxiological understanding of game making as a widely spread knowledge (Kultima 2018). Where people follow games as culture and consume game products in various ways and contexts, they don't necessarily follow the trends in tool development. Small game making tools are still mainly known within relatively small communities of hobbyist game makers, selected educators and within game jamming communities. Even though game jam games might lack polish and complexity, or might not even work — they are often shared publicly or even published on various platforms. Lowering the expectation level emancipates game creators around the world. In a sense, this gives more leverage for creating games as *Playable Concepts*.

Many educational games do not succeed in even an intermediate level of quality compared to commercially published games — but do they really have to? And why not focus on smaller design goals instead of pursuing standalone games that need to be polished, rigorously iterated, tested and packaged for mass distribution? The time is now for challenging the ludological exceptionalism (Stenros 2015): games can and are part of contexts that are dominated or defined by something other than games themselves. They are normalized parts of the intertwined networks of communication, expression, media, and experiences. While there is value for us game researchers to study games as something special, in reality (most) games are not so exceptional. Using games as part of an internet article, for instance, does not have to be rationalized by appealing to the special communication power of games — games can be used with less pressure to defend their existence. We could call this a *secular* or *atheist* use of games — abandoning the belief in the mystical, motivational and unique power of games, in favour of treating games as everyday and mundane. Framing games as *Playable Concepts* is not only relevant for educational games, or games in classroom environments, but other types of games or games used in various communicational roles. For instance production problems expressed in a newsgame project by Wolf and Godulla are similar to the challenges expressed in educational game research (Godulla and Wolf 2018). Even though for instance game jams can be used to solve some of these problems, as proposed by Grace in a project exploring game jamming in the context of newsroom (Grace

2018), even that project aimed for standalone products instead of embedded games or games with a partial role. We are asking: why aim for full standalone games? Games don't have to carry the communicational burden alone (*Value of Partiality*), but can be presented within a context (*Value of Embeddedness*) that shares this burden. In a similar vein, games don't all need to be innovative (*Value of Reusability*) and they can be designed to be ultra simple (*Value of Simplicity and Immediacy*).

With *Playable Concepts*, we started from the notion that games are always dependent on varying degrees of context and framing when played. The framing that is presented with the game, but is not necessarily considered part of the game, such as the title, trailer, website, and development logs, can be seen as the game's *paratext* (Glas 2016). Paratext can create expectations for gameplay, or fill in gaps of representation, such as in the case of more detailed cover artwork on pixel art games, or rule books that explain and narrate the metaphor of the game for board games. In the case of minimalist games, the often overlooked components such as the title of the game can be essential to what meanings and representations the player prescribes their interactions, especially if aesthetic components of the game are kept abstract or highly stylized.

In the case of *Playable Concepts*, however, we look at games as fully embedded into their context with intention. The environment the *Playable Concepts* has been embedded into — example use cases include a blog post, an online textbook, or a news article — is not just treated as a paratext or frame for the game. Instead, the juxtaposition and interplay caused by embedding the game invites interpretations. In this sense, *Playable Concepts*, as intermedial expressions, share a resemblance to the interplay between illustrations and verbal texts.

Together our design values form a design space that we believe has the power to challenge existing design paradigms of treating games as standalone and isolated. This change in design thinking, we believe, can lead to a more sustainable and fitting role for games within utilitarian contexts. We argue that the main obstacle for creating games as *Playable Concepts* are the valuations and persistent beliefs of what constitutes good games and how (all) games should be designed or used. Our implicit models for games are obscuring us from seeing alternative paths. This can be alleviated by purposefully adopting an explicit set of game design values.

FUTURE WORK

The five design values of *Playable Concepts* presented in this paper are based on our observations, inspiration from design precedents, and alternative paths in modeling games. However, we have already moved towards putting our framework of *Playable Concepts* into practical applications. In the Aalto University Playable Concepts project, we have designed twelve (12) tiny games, built with Construct 3, and conducted workshops with teachers and gamers to further explore our approach in practice. In addition to this, we have also collaborated with the Ludic Quantum project at Aalto University, developing a total of four (4) tiny games with Unity game engine (Unity Technologies 2019) and four (4) games with Construct 3 game engine (Scirra Ltd. 2020). Each of these games support in explaining a single concept in quantum physics and game design, and are placed within an internet article (Heiskanen 2020) (see Figure 5).

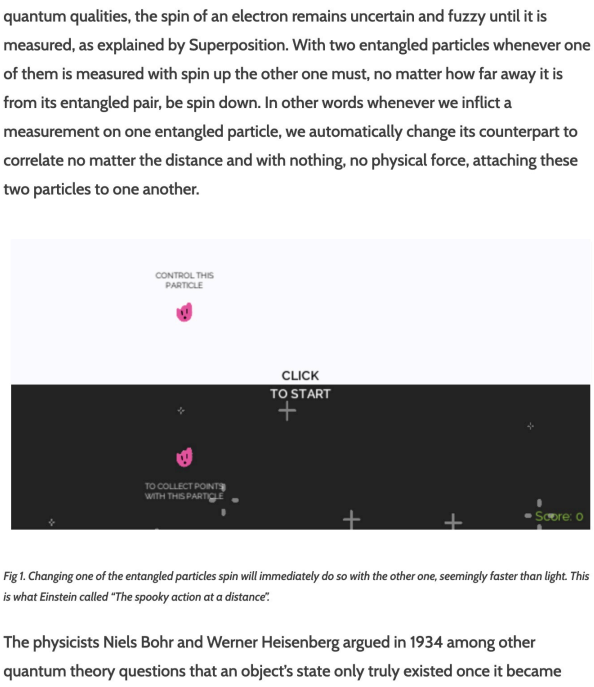

Figure 5: Screenshot of *Playable Concepts* use case in the Ludic Quantum project

To test the practicality of the *Value of Partiality* and *Value of Embeddedness* of *Playable Concepts*, we tested and demonstrated to our workshop participants how to embed interactive games into commonly used presentation software. It came to our attention that certain presentation software do allow direct embedding of games in presentation slides, with the help of third party plug-ins. This indicates current technology is, while not fully there yet, improving. To explore the *Value of Simplicity and Immediacy*, as well as the *Value of Reusability*, we developed and shared sample games, and 2D art asset libraries, available to anyone to download and mod. We are expecting to continue this work, to further explore the usefulness of our approach within learning and communication in the classroom environment. Furthermore, what we aim to do in the future is to run specific experiments on the role of the textual context for our games and further elaborate the framework based on these experiments. The results of the project can be found at playableconcepts.aalto.fi.

CONCLUSION

In this article, we have explored games as *Playable Concepts*. We have marked a specific design space that has been inspired by interesting game examples, our observations on the game industry, as well as seeking alternative paths of modeling games - motivated by challenges in educational game design productions. We have argued that in order to challenge our persistent views on what is valuable in games, or what is good game design, we need to follow distinct design values when creating games as *Playable Concepts*: *Value of Partiality, Value of Embeddedness, Value of Simplicity and Immediacy*, and *Value of Reusability*. We argue that creating games as *Playable Concepts* can place games in a more normalized role among other forms of communication, which could afford more sustainable production realities of educational games and game-based learning.

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ENDNOTES

1. See http://onlinelearning.aalto.fi

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