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Applied Games – In search of a new definition

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Abstract. The endeavour of transferring attributes and qualities of games and game experiences to users and contexts apart from entertainment values spanned a wide field of research over the years, along with a diversity of classifications and definitions. While respecting their uses, we argue that this diversity might also hinder cross-disciplinary research efforts on fundamental questions and co-operation with practitioners. Moreover, with the postulated development towards a ludification of culture under way, it may become more difficult and less important to distinct examples among these definitions in future.
Hence, we propose rethinking existing definitions and suggest the term of applied games as a starting point for a discussion about a more holistic and contemporary term and future common ground. This paper provides definitions of the artefact applied game and the process applied game design as well as suggestions on a classification of purposes and some research questions.

Keywords: Applied Games, Serious Games, Game Based Learning, Gamification, Game Thinking, Definition, Game Design

1 Introduction

Games spread. Driven by technological advances and sociological acceptance, games become increasingly ubiquitous and social. The economic success and unique experiences well-designed games are able to create, is accompanied by a rising interest of utilizing these qualities for purposes other than entertainment. The term *serious games* emerged in the 70s [1] and marked the beginning of an ongoing endeavour of researchers and practitioners alike, that has led to a wide range of genres and classifications to date. As such, games and game-inspired designs, as well as the development of a game-literacy, may well play a part in understanding, engaging and solving issues of a increasingly complex future world [2]. Consequently, more people with multiple backgrounds will design game-like experiences in broader contexts, pursuing new goals, and thereby contribute to the discussion on ludification and the pervasiveness of games [3].

adfa, p. 1, 2011.

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Being aware of similar problems in genre classifications of entertainment games [4] and in line with others [5], we argue that the range of definitions and terms we see today may be contra productive towards this development. Therefore, we suggest a more holistic and contemporary. As a starting point for the discussion, this paper offers a definition of the *artefact* ‘applied game’ and the corresponding *process* ‘applied game design’, along with a high-level *classification* of purposes today’s applications usually address. Applied games are defined as an *implementation of a subject, inspired by and designed along a context- and user-centric transfer of design concepts and qualities from the game world.*

After briefly reviewing the most common terms used in the field, this paper presents arguments of their usage and limitations in the academic world and practice, followed by a detailed explanation of the suggested definitions.

2 Related Definitions

The binding power and numerous forms of excitement that players experience when playing games as well as their economic success have been inspiring researchers and practitioners alike to utilize games for decades. Subsequently, many terms were coined over the years alongside a progressing ubiquity and rising acceptance of games in the research community and public.

Entertainment-Education and *Edutainment* were popular trends in the 90s and early 2000s. Educational contents and game play were only roughly interweaved. Despite a certain fun factor, these products often left players with a somewhat artificial feeling about their usefulness [6].

With a strong focus on learning and training, s*erious games* is probably the most popular term nowadays. Defined in the 1970s by Abt as games which "have an explicit and carefully thought out educational purpose and are not intended primarily for amusement" (p.9) [1], serious games developed a plethora of genres over the years. Purposes common to these genres are learning and training [7]. Ritterfeld further developed the term to "any form of interactive computer-based game software for one or multiple players to be used on any platform and that has been developed with the intention to be more than entertainment" (p.6) [8]. Serious games usually fit formal game definitions, in contrast to e.g. Gamification [9]. As an annotation, another interesting part of Abt's book is seldom referenced: He proposes games as some specific way of looking at something, both in a rational/analytic and emotional/dramatic way, which may be interpreted as an early idea of game thinking, today.

Game based learning (GBL) or rather its digital equivalent DGBL is strongly connected to Prensky's broad notion of using games to design engaging

and contemporary (e-)learning environments for the games generation [10]. While sharing the focus on learning with serious games, DGBLs are not necessarily full-fledged games. However, the concepts are close enough to be used interchangeably in publications. Less frequent terms sharing the strong focus on learning are *educational games*, *game enhanced learning* or the slightly different notion of games as *educational technology*.

Games with a purpose (GWAP) define games players use collaboratively to perform tasks computers cannot perform or not effectively perform [11]. More commonly known as 'citizen science' projects nowadays GWAP became quite popular over the years for projects with high social acceptance [e.g. 12, 13].

Gamification or rather *gameful design*, formally defined in 2011 by Deterding et al. [9], is the use of game design elements in non-game contexts. The term gamification is very popular and almost used inflationary in both academia and practice nowadays. Freyermuth and others criticise the constringent use in practice, mostly adapting 'simple' game elements to persuade or primarily target user engagement [14, 15]. However, the idea's popularity promotes a discussion about the "pervasiveness of gaming in everyday life" (p.10) [17].

Apart from the definitions above, many authors highlight the general capabilities and overall positive features of games. For example Gee explores the properties of digital games with a strong focus on learning. His numerous contributions on the topic include the description of *learning principles* [18] and the *Situated Learning Matrix* [19]. Bogost discusses the general expressive power of video games, apart from instrumental goals (i.e. serious games). He suggests that video games offer a new form of *procedural rhetoric*, describing a process of interaction by which the contents of the game are transported to the player, possibly leading to a change of attitudes and beliefs [20]. According to Schell, games are transformative, consequently suggesting the term *transformative games* for a class of 'helpful games', which primarily focus on changing the player. He stresses that "educational games are one kind of helpful games" (p.507) [21] and disagrees with the notion of seriousness as games are "meaningfully helpful" in many ways, and fun to play at the same time.

On a broader scale, all of these definitions share a common idea: the application of games (i.e. game design concepts, -elements, -attributes, -techniques) to fulfil certain goals (e.g. learning, mindset and behaviour change), whether in parts or as an actual game, within other or non-game contexts. Consequently, the term *applied game* is not new, but conceptualized differently in academia and practice. For example, the Center for Applied Games [22] proposes the use of game principles for behavioural change. The region of Utrecht (NL) launched a network site for applied game design, using it as an umbrella-term for serious games, exergames, etc. [23]. The MIT Game Lab hosted a panel on

applied game research in 2012 [24] and the term defines research fields of the Zurich University of Arts [25] and the Department of Arts of Danube University of Krems [26]. Along with a Microsoft Research Group on the topic [27] and a definition by Kim [28], these developments call for a discussion about a thorough academic definition of the term.

3 Relevance and limitations of current definitions

The technological developments, growing sociological acceptance of games and interest of multiple disciplines drive the development of new and innovative game concepts in everyday life. Established and well-accepted definitions allow the classification of the majority of these examples, usually along their *design specification* (e.g. serious game) and/or *target* (e.g. health game). Despite relatively broad definitions, a rising number of these examples does seem to blur between the definitions. Likewise the entertainment games business, this might drive the development of ever new terms and genre combinations to fit an example. For example, the mobile application "Zombies, Run!" [29] is often used as an example for Gamification. It applies game elements like a story, a level-like session structure and collectable items for engaging a sporting activity, that is a non-gaming context. Yet, it is also a complete game: All activities and challenges are embedded in a consistent metaphoric game world with fixed rules and variable outcome depending on interactions and resources of the users. If its purpose is understood primarily as supporting the player's healthy behaviour, it is also a serious pervasive game.

From an academic point of view, having multiple and distinct definitions is useful and important. Results and conclusions from research work are assigned to specific classifications to strengthen their value, relate to other work in the field and define limitations of transferability. Insight derived from the evaluation of a certain game is supposed to be valid for comparable applications but usually not generalizable. The same applies to comprehensive attempts to establish design methods, tools and evaluation procedures, e.g. [4, 30–32]. On the other hand, because there is room for interpretation and uncertainty which definitions suit one's work at best, inconsistent or ambiguous use of terms and classifications is increasingly common in publications, eventually leading to a fragmentation of the field [5]. With emerging cross-disciplinary research fields (e.g. game psychology) and a rising interest of disciplines in the application fields (e.g. business economics), this practice might grow into a problem. Without a discussion about a new common ground, as proposed here, it will become increasingly difficult to find and relate results to one's own work.

In addition, while the clear use of more established definitions for *specific* questions helps to advance the field, it might also hinder the work on general ones

across the field. For example, a rising number of researchers of multiple disciplines (game design, psychology, social sciences,…) tried to shed some light onto the *black box* of emergent gameplay and resulting effects on players by focussing on the player's experience and the context rather than on mere design aspects [33]. The call is out for a general discussion on appropriate research methods and insights on the effects of certain game elements and the more targeted design for specific purposes of game-like applications [34]. The same applies for more varied empirical methods and results on *outcomes and purposes* of game approaches among their players and the difficulties to conduct such studies within specific contexts [4, 5, 35].

Regarding design considerations, having many definitions might additionally hinder innovative designs on a psychological level. Discussions of a currently designed prototype will take place in the light of the initially chosen classification, thereby possibly influencing the design process and limiting consideration of alternatives and innovations. The same counts for established ideas, methods and tools, although other methods (e.g. used in related, differently defined game contexts) might be more suitable, but not found due to a challenging selection of search terms among the high numbers of publications.

While relevant for academic goals, the discussion is also important for the commonly frequent cooperation with practitioners. The objectives of industrial partners and researchers often differ for natural reasons. While researchers are mostly interested in empirical fundamental work and the transfer of results, industry is mostly interested in outcome supporting the organizational goals. To our own manifold experiences, definitions relevant to researchers are of nearly no relevance for non-researching practitioners as they are complex to relate to for non-experts. Therefore, researchers often experience difficulties arguing for the main ideas and differences of definitions. The same counts for cooperation with more 'hands-on disciplines', such as the design studies and arts. Consequently, the proposed term applied games already is used within this disciplines and organizational contexts [22–27], calling for the discussion about a clear academic definition to build the basis for a common ground among researchers and research an practice alike.

When including the perspective of the user, clear differentiations get even more complicated because of individual interpretations of the experience such as the notion of the seriousness of play [20, 36, 37]. For instance, for some users "Zombies, Run!" might indeed reinforce walking and running activities. Others like the additional entertaining value to an already established habit and again others actually experience a game. Training simulations can be experienced as games in the same manner [37]. A stronger focus on the pursued and perceived outcome of a game approach could be a more natural way for a classification.

With the rising ubiquity and pervasiveness of technical platforms and hence game applications in various forms, a new discourse on games and play in society is under way [3]. The discussion about a more comprehensive term must

reflect this development and take the advantages and disadvantages described here into account. With *applied games* and its corresponding terms, this paper argues for a definition that manages to bridge gaps between multiple disciplines of researchers and practitioners. It builds on what is central to most definitions, spanning a wide design space but also a stronger, user-centric focus on the purpose of an application instead on appearance and aspects of game design.

4 Applied Games

The following chapter first defines the *process* of applied game design followed by the corresponding *artefact* applied game and a suggestion on a *classification* of potential purposes in clear contrast to genres.

4.1 Applied Game Design Definition

Applied Game Design is *the user-centric transfer and implementation of design concepts from the game world, in order to confer their individual, social and procedural qualities to a subject of interest, within its situated context, in order to pursue a defined goal.*

Transfer. The transfer consists of two phases. A creativity process, which is characterized by an open mode thinking [38] and a gameful attitude. That is, one tries to understand a situation and users by thinking about it as if it was a game rather than what it actually is and about players rather than users or stakeholders. This gameful attitude, some may call 'game thinking', combined with a deep understanding of what games are, does help to come to creative and innovative ideas [39]. Or as game designer Eric Zimmerman put it: "(…) playful, innovative, trans-disciplinary thinking in which systems can be analysed, redesigned, and transformed into something new" [2]. The ultimate goal of this first phase is to develop *strategic design goals* and *functions*.

Consequently, the second phase is about *operationalizing the goals* on the actual context, with the user's needs and goals in mind, developing the *form*. During the closed mode [38], ideas and design goals are consolidated, prototyped, tested and rethought – constituting an actual design process. Applied game solutions usually inspire or contain affordances users interact with, the design of content, and a seamless and coherent integration to the environment and adjoining processes.

If learning or training is a primary goal of an applied game solution, its supportive character to acquire and apply the learning goals in practice constitutes a *third level of transfer* on the user's side. As a common goal to serious games, game-based learning and training simulations, applied game designs inherit all

relevant research questions connected to the design and evaluation of such applications and the players transfer of knowledge the into the real world.

In contrast to the definition of serious games [1, 7, 8] and gameful design [9], applied game design does not differentiate partly or full-bodied implementations of game concepts but would incorporate both forms. They are not limited to their spatial representation but incorporate both the ubiquity of technology and space in terms of pervasiveness as well as the mixtures of digital and non-digital components. The ultimate challenge is to create an innovative applied game concept that fits both users and context and contributes to the defined strategic design goals.

Concepts. Manifold as the disciplines constituting a game in the entertainment world are the sources of innovative design of applied games. Three categories derived from games help to structure thinking during the transfer processes and formulate questions about the design approaches and goals.

Formal Concepts. Formal concepts support understanding the structure and dynamics of games. Fullerton's model describes the most important parts games consist of as well as their purposes [40]. Inspired by the model, one could ask about the rules or procedures of a business application, as an easy example and source for inspiration to redesign it. The MDA Framework helps to explore the relationships of designed mechanics (M), emergent dynamics (D) and aesthetics (A) [41]. Interaction-Feedback loops are a quite worthwhile model by Dan Cook [42]. Its core idea is an atomic view on chains of interrelated affordances, interactions and feedback that alters the player's mental model of a game mechanic and constitutes a learning process. Cook's ideas correspond with Koster's [43] theory of fun and Klimmt's considerations of multilevel I/O loops, as explanations of entertaining qualities of games [44].

Game Design Concepts. Concepts of game design form the largest category. A deep understanding of games, their mechanics and emergent qualities of game play as well as psychological backgrounds of people and subject is a precondition for a successful transfer. It is therefore one common and eligible critic to gamification that most examples only use quite shallow, behavioural implementations of most common feedback mechanics [14, 15], lacking more complex concepts that render games deep and lasting experiences. However, rethinking simple feedback mechanics of a subject alone often makes a huge difference and is a common demand in the field of usability and user experience, too. Other examples of more complex concepts likely to inspire ideas are the design of challenges and meaningful choices [20, 21] or for curiosity [45].

Some major difference of these is the focus on the experience and volitional qualities, compared to the mere goal orientation as a common focus.

Depending on the subject of applied game designs, other design disciplines are worth a look: for example, graphical styles and audio-visual representations of games, the integration of story and story elements in games, the design of game interfaces and tutorials. The major challenge is to choose the most suitable concepts and think about options to transfer the core ideas and core experiences to the subject addressed within the applied game design. One of the many research questions included in this endeavour is that about the temporal effects of the resulting design within its context. Which mechanics and elements foster a long-term motivation, which wear off quickly - and is this a bad thing at all? To continue on the example of a training simulation in business contexts, it might be all right or even desired that the applied games experience wears of when its contents are learned.

Technical Concepts. The use of technical concepts and solutions supplements the idea and greatly supports the transfer and implementation, but is not a primary focus for creativity. A solid understanding of game architecture and the ability of using game technology, game specific algorithms and technical solutions to collect game metrics and interaction technology is an important part of a comprehensive game literacy [2].

Qualities. The term qualities refers to different experiences attributed to games as well as design concepts to structure and uphold those in support of the design goals. *Individual perceived qualities* often attributed to games are feelings of self-efficacy and tension [42], curiosity [45], mastery and fun [43] and intrinsic motivation [46]. The idea here is not only rendering a subject more attractive and rewarding, but more meaningful. *Social qualities* would be those connected to team building and team playing. Equally important to real life contexts is the cause and effect of applied games to foster social intercommunication about the subject. *Procedural qualities* are ideas derived and transferred from structural and dramatic elements of games [40] and interaction-feedback loops [42, 44]. Examples are dividing a subject into levels, interweaving with a story, character design and development and the building of skill chains. These and other elements help designers to create *simulated experiences* [44] and guidance for structured, comprehensible and joyful experiences.

Subject. The subject of an applied game design defines the actual medium as well as the social, spatial and temporal design space. The simplest form of a

subject would be a *single artefact*, such as a room or a display. The second category would be any form of *application*, some business software, mobile application or else, including its situated context (see below). The third category would be any form of a wider scale *process* (spatially, timely), such a strategic or operational business process, learning of a subject or pursuing a specific fitness goal. This consequently involves a much broacher design scope.

Situated Context. The more ambiguous the design goals are the more specific information and individualization in terms of person and context is advantageous. In their introduction, Moseley and Whitton correctly emphasized the purposes of games with respect to specifications of a context in contrast to "universal truths" such as games are good for motivation [47]. The interaction of a person with the environment is certainly not new to the idea of applied games. Depended on the subject, other disciplines such as Human Computer Interaction and Organizational Psychology, discovered a plethora of theories and methods to research, analyse and design for complex contexts.

Context can be structured into three spheres, typically with a declining design scope: The options and varieties of interaction with the *subject* (spatial, temporal, social) (1), its *interrelations* with other subjects and processes on a greater scale (2) as well as the social and organizational *environment* (3) (e.g organizational structure). The latter has great influence on the users within a context and therefore the design on a broader scale [16] and vice versa.

Purpose. Purposes are the strategic goals, defined for an applied game. They often consist of multiple, often diverse perspectives, such as design goals and user goals/needs that need to be respected. Purposes and their classifications are discussed in detail in section 4.3.

4.2 Applied Game

Applied games are the result of an applied game design process. They are an *implementation of a subject, inspired by and designed along a context- and user-centric transfer of design concepts and qualities from the game world.* Applied games consist of multimedia, digital and/or non-digital artefacts that constitute an individual and/or social experience for their respective users.

Quality of Applied Games. The quality of an applied game can be assessed on three distinctions. First, regarding the interpretation of the quantifiable and observable results of an interaction process, according to a defined goal, such as the interpretation of increased user activity. While it may be relatively easy to produce impressive numbers of increased overall activity, differences in quality

of a specific interaction are often harder to identify. Second, the quality of support for explicit or implicit, individual user goals within the subject has to be considered. Does a health app really result in an expected behaviour change and consequently better health results? Does a social network help users to spread their network and connect emotionally to others? Third, the question is to what extend does the applied game meet its goals over time. For example, if the goal of an applied game application is to learn about some process its end point is reached when a user has internalized the process. Increased user activity on a social intranet platform on the contrary is a long-term goal that might need different design approaches and timely updates. It is crucial to include a time-perspective when setting goals and constraints of an application.

Evaluating the quality of applied games inherits the core challenges researchers and designers of serious games, game-based learning and gamification have faced for years. From a methodical viewpoint, experiences and tools about how to measure effects are rare and, because of complexity and dynamic effects of play, often difficult to measure and relate to aspects of an applied game intervention. Some criticize effect studies that may not advance the deeper knowledge about why the effects occur [34] or are not quite methodologically comparable. Consequently, Connolly and colleagues criticize the ratio of speculation about the use of games compared to actual evidence in their meta-study as well as methodological groundings [4]. Availability of resources in terms of time, money and contextual specialities, such as difficulty of sample size [35] additionally render evaluation difficult.

4.3 Classification of Purposes

Application fields [7] and genre taxonomies dominate the current practice of classifying entertainment games or applied forms of games. Both seem not suitable for the field of applied games for two reasons. First, neither the research community nor the entertainment industry did develop a commonly accepted taxonomy to date [4]. Second, according to the definition of applied games and applied game design proposed here, a *defined purpose* is more important than a classification of application fields or along its *actual design solution*. Moreover, the latter highly depends on the context, user and design group actually involved in the subject. Especially the user perspective is of high importance. It should correspond with the needs and provide usefulness to be successful and might contradict to other stakeholder's goals [32].

Conolly et al. propose a useful classification for serious games that follows a comparable approach [4]. As a subject to discussion, they introduce a refined version of their framework of learning outcomes consisting of (a) knowledge acquisition, (b) skill acquisition, (c) affective, motivational and physiological outcomes and (d) behaviour change outcomes [4]. Based on their previous work

and results from expert meetings, this paper proposes a list of *strategic purposes* common to applied games to be operationalized on the context as mentioned before.

1. Attention: The design for getting, guiding and keeping attention towards a subject as well as raising awareness.
2. Motivation: The arousal or support of individual needs and motives. Designers should strive for volitional support and the design of a journey instead of a mere goal orientation wherever possible.
3. Knowledge or skill acquisition: The focus on or support for acquisition and training of knowledge, skills and behaviours by designing for meaningful experiences on the cognitive, emotional and physical level. Certainly the primary class of applied games, likewise its predecessors.
4. Process support: The aim to help users structure, restructure, facilitate or execute processes or goals. The means of this category is an actual support for planning, execution and monitoring (e.g. feedback) instead of a mere breakdown of a task into levels.
5. Joy/Playfulness: The purpose to create a subject more joyful and/or provide a playground and affordances to trigger a playful behaviour.
6. Information: The attractive and digestible presentation of information.

The list is non-exclusive and applied games will typically implement more than one purpose. Furthermore, the social context is an important complexity in design and reception of an applied game and as such part of the experience instead of a class in its own right. For example, the onboarding of social intranet users will need to get their attention and constitute options of knowledge acquisition to show users how and why the new tool is useful compared to current ones.

5 Conclusion and Outlook

This paper argues for a new academic definition in the field of game applications. With a stronger focus on what is central to related definitions and on process and purposes, the term applied game is a statement towards a common ground among academics and practitioners alike, and as such contributes to a broader discussion. In the light of a growing diversity and ubiquity of innovative examples and application fields, the current range of academic definitions and classifications does not fully support advances in the field for the several reasons discussed. Among them, an inconsistent use due to room for interpretation, relevance in practice, influence on creativity and the spreading of work on more general research questions. While respecting the uses of established

definitions, e.g. for specific research questions and methods, the proposed definitions in this paper address these issues. Applied games focus on the transfer of broader qualities of games. They are classified by the definition and operationalization of strategic purposes along a user-centric applied game design process. Consequently, the goal and grand challenge of any applied game design would be to convey a meaningful best-fit combination and transfer of these qualities to the subject at hand, with respect to its users, situated context, and in pursue of the defined design goals. Along with discussions on the definitions and classification, this paper encourages cross-disciplinary researchers and practitioners alike to develop and further intensify work on a pool of research questions central to all applied game projects. Complex subjects, such as the relationships of a design to emergent gameplay and effects on the player, diverse and effective ways of evaluating the purposes in different contexts, and the design of more varied and deeper forms of experiences are long-term challenges. At last, the term applied game might constitute a common ground for an unbiased discussion of the various forms we may encounter game applications in our future everyday life. By the suggestions given in this paper, the authors hope to promote a lively and joint discussion to advance the field.

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