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game design assessment framework*

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Purposeful by Design?

A Serious Game Design Assessment Framework

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ABSTRACT

The lack of assessment tools to analyze serious games and insufficient knowledge on their impact on players is a recurring critique in the field of game and media studies, education science and psychology. Although initial empirical studies on serious games usage deliver discussable results, numerous questions remain unacknowledged. In Particular, questions regarding the quality of their formal conceptual design in relation to their purpose mostly stay uncharted. In the majority of cases the designers' good intentions justify incoherence and insufficiencies in their design. In addition, serious games are mainly assessed in terms of the quality of their content, not in terms of their intention-based design. This paper argues that analyzing a game's formal conceptual design, its elements, and their relation to each other based on the game's purpose is a constructive first step in assessing serious games. By outlining the background of the *Serious Game Design Assessment Framework* and exemplifying its use, a constructive structure to examine purpose-based games is introduced. To demonstrate how to assess the formal conceptual design of serious games we applied the *SGDA Framework* to the online games "Sweatshop" (2011) and "ICED" (2008).

Categories and Subject Descriptors

K.3.1 [Computers and Education] Computer Uses in Education; H.5.2 [User Interfaces] – *Evaluation/methodology*

General Terms

Design, Theory, Measurement

Keywords

Serious Games, Game Design, Assessment, Learning in Games, Educational Game Design.

1. Introduction

In his book "Truth and Method" Hans-Georg Gadamer [17] notes an interesting paradox about the contradiction between playfulness and seriousness. He states that on the one hand "what is merely play is not serious", and on the other hand "play itself contains its own, even sacred, seriousness".

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When we play games we voluntarily confront ourselves with "unnecessary obstacles" [40]. Yet, these unnecessary obstacles are taken seriously within the frame offered by the game space. Within this playful frame the game can become extremely serious for the players. Thus, the majority of games are not created to fulfill a serious purpose – most aim to engage, entertain or satisfy the players. On the contrary, the so-called *serious games* intend to fulfill a purpose beyond the self-contained aim of the game itself. Serious games engage with the intention to "convey ideas, values, and sometimes at persuading the players" [15]. In addition, these games have the purpose of influencing the players' thoughts and actions in real life contexts, as well as exceeding the self-contained scope of the game itself. Although irrefutable empirical evidence about the impact of these games is still lacking, the trend to design "serious games", "games for change" or "social impact games" has undergone a rapid upswing in the last decade. The designers' good intentions paired with the popularity of video games as audiovisual technologies attract the attention of the media, NGOs, politicians, activists, teachers, artists, and designers [6, 14, 26].

Serious games are often deemed successful if they generate discussion and attract attention – the quality of the game design or the actual impact on the players remains mostly unobserved [12, 29]. Often their "good" cause and serious content outshines concerns about their actual ability to evoke the players' learning or to impact their lives. In contrast, we argue that this inadequate justification misses the mark and prevents constructive discussion, criticism and exploration of their potentials and limits. If serious games aspire to be validated as useful and constructive tools to foster learning, social change or advance understanding of social issues, their impact on the players has to be studied and the quality of their design evaluated. The aforementioned crucial absence is also mirrored in many studies on serious games as questions concerning the quality of the design are often overlooked. Counter to this, we argue that not only the players' mindset and the contextual framing of the play situation influences the impact of serious games, but also the way the games' purpose is channeled through their conceptual design.

This paper intends to compensate for the lack of assessment tools by presenting an analytical framework for serious game design analysis. The *Serious Game Design Assessment Framework* or *SGDA Framework* (as it will be referred to from here on) attempts to offer a structure to study the formal conceptual design of these games in relation to their explicit and implicit purposes. The framework should not be understood as an indubitable and objective measurement instrument, but as a suggestion on how to structure the assessment of serious games in terms of their design. The *SGDA Framework* was developed as part of a broader

research project carried out at the Singapore-MIT Gambit Game Lab at the Massachusetts Institute of Technology, which focuses on the transformative learning impact of serious games for social change on a theoretical and empirical level.

2. BEYOND ENTERTAINMENT?

Before tackling design related questions, it is important to contextualize this inquiry by framing what serious games are. Clark Abt [1] established the label “serious game” in his book of the same title in the 1970s. His definition pairs the “the experimental and emotional freedom of active play” with “the seriousness of thought and problems that require it”. Furthermore, these serious play activities follow an “explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement.” [1]. However, Abt adds that the seriousness of the games does not imply that they are boring, solemn or humourless, just that entertainment is not their paramount goal. In a nutshell, serious games are purpose-driven playful environments intended to impact the players beyond the self-contained aim of the game. Serious game design is based on their purpose, their mechanics and rule-sets, fiction and narrative, their aesthetics and framing and their content. Thus, how the purpose of the game is reflected is fundamental for its holistic design. Similarly, the game designer and artist Mary Flanagan [14] argues that “serious games are among the most challenging games to design” as they try to be enjoyable and effective at the same time. Moreover, we argue that if the design of serious games is based on the specific explicit purpose to impact the players beyond the game itself, this intention has to be conceptually considered in every feature of the game during the design process. In line with our approach, researcher Ian Bogost questions the value of the term serious games and proposes “persuasive games” [6] as a better fit. However, the aim to “persuade” the players does not apply to all serious games, as many are designed to raise awareness, to challenge prejudgments, or to simply offer information or communicate political statements. Concisely, it can be argued that what all serious games have in common is not their content, their persuasiveness or lack of entertainment, but their impact-driven purpose. *Serious games are intentionally designed to have a purposeful impact on the players’ lives beyond the self-contained aim of the game itself.* In this sense serious games are purposive by design [27]. They are designed to offer a playful environment that provides “serious” content, topics, narratives, rules and goals to foster a specific purposeful learning outcome.

Even if first studies on the impacts of games for social change were conducted in the last decade [12, 21, 29, 31] systematical knowledge on their effectiveness is still lacking. Since the assessment of their impact on the players appears crucial, the question of how to appropriately evaluate serious games is of paramount importance. Investigating their impact becomes incomplete if the games’ purpose and their coherence in relation to their design is not identified beforehand. Therefore, we argue that research on the impact of serious games starts with the analysis and evaluation of their qualities in terms of their purpose-based formal conceptual design.

3. THE DEVELOPMENT OF THE EVALUATION CRITERIA

A variety of publications on game design and design strategies have been published in recent years [16, 23, 32, 33, 36]. In most of these classic design instructions, serious game design is at best mentioned but not outlined in detail. Some publications focus on serious game design particularly in the last years [22, 35], but when it comes to questions regarding their assessment (and not

their players) valuable tools are absent. Sanya Liu and Wan Ding [35] mention that “serious games involve pedagogy” in comparison to entertainment oriented games. Peter Smith and Ben Sawyer offer an interesting *Serious Games Taxonomy* [39]. Yet, publications on serious game evaluation and assessment tools are rare so far. Three exceptions are Brian Winn’s [43] “Design, Play and Experience Framework”, Leonard Annetta’s and Stephen Bronack’s book “Serious Educational Game Assessment” [2] and Eric Sanchez’s whitepaper “Key criteria for Game Design A Framework” [34]. In the following section the framework of criteria to assess serious games and educational games of these three studies will be summarized and reflected.

Brian Winn’s “Design, Play and Experience Framework” (DPE) “presents a language to discuss design, a methodology to analyse a design, and a process to design a serious game for learning” [43]. The framework focuses mainly on the design of serious games, but also provides “a structure to decompose the elements of a design.” [43]. Regarding the design, Winn focuses on four elements: *Learning (content and pedagogy)*, *Storytelling (character, setting and narrative)*, *Game play (mechanic)*, and *User experience (User Interface)*. Although the framework shows strength in terms of theoretical grounding and reflection on the educational impacts, the main focus of the assessment lies on the educational framing, not on how the purpose is considered within the formal conceptual design. Winn defines the “heart of serious game design” as “the ideal overlap between pedagogical theory, subject matter content, and game design [43]. In addition to his findings we propose a purpose-based approach that reflects the cohesiveness and coherence of game design.

Annetta, Lamb and Stone [2] not only offer a complex set of theory-based criteria but they also propose a quantitative method of evaluating the significance of the ratings by the testers. Their thirteen elements are: *Prologue*, *Tutorial/Practice Level*, *Interactive Feedback*, *Identity*, *Immersion*, *Pleasurable Frustration*, *Manipulation*, *Increasing Complexity*, *Rules*, *Informed Learning*, *Pedagogical Effectiveness*, *Reading Effectiveness*, and *Communication* [2]. In comparison to Winn [43], Annetta, Lamb and Stone also propose an empirical method to evaluate their test results. The drawback of their approach lies in the fact that their study does not reflect the games’ purpose at all. In their assessment, single components are decontextualized but the cumulative conceptual design system and its cohesiveness is not examined. In contrast, we argue that the pedagogical effectiveness and the impact on the learners cannot be measured if the game’s purpose is not identified, and its coherence within the game system analysed.

Finally, the third framework by Eric Sanchez focuses on seven elements: *Motivation–Competence*, *Motivation–Autonomy*, *Motivation–Relatedness*, *Content*, *Freedom*, *Rules & Feedback*, *Mistakes*, *Failure & Emotional Aspects* and *Game Integration* [34]. This assessment approach does not clearly differentiate between the design and the play experience. Once more, the purpose of the game and how the intention is tackled goes unnoticed. Although all three approaches [2, 34, 43] are appealing and offer different ways of analysing (and designing) serious games further criteria to evaluate the games’ quality need to be introduced.

Looking at the aforementioned tools and facing the lack of knowledge on how to structure a constructive discussion about these purpose-based games, we developed a holistic assessment framework that structures the different elements of the design. In addition, it focuses on the relation between them. Without

claiming to deliver an irrevocable tool for serious game assessment, we propose a concept that focuses on the cohesiveness among the essential design elements and the coherence in relation to the games' purpose. If serious games design is based on a specific purpose and with the intention to impact the players, these aspects need to be reflected and conceptualized in the holistic design of the game. Assessing how the purpose is channeled in the design process and what impact it has on the player is a paramount challenge for games research. The so-called "Serious Game Design Assessment Framework" was created during an iterative development process based on the examination of different serious game design patterns. The outlined framework should not be understood as an objective instrument but as a constructive tool to offer grounds for critical discussions about serious games.

The idea behind the *SGDA Framework* is similar to Doug Church's "Formal Abstraction Design Tool" [11]. It is an attempt to offer a basis to study how the design elements are configured formally and conceptually in relation to the game's aim and purpose. In our design analytical and educational approach we identified six essential components of the formal conceptual structure underlying a serious game. If we regard serious games as purpose-based game systems, the driving force that functions as the pivotal influence over the elements of the game design should be the *purpose* (3.1) of the game. Thus, the purpose should be reflected in all the elements that support the game system: *content* (3.2), the *fiction & narrative* (3.3), the *mechanics* (3.4), the *aesthetics & graphics* (3.5), and the *framing* (3.6). The relation among these six core components impacts the coherence and cohesiveness of the formal conceptual design of the holistic *game system* (3.7). The order in which these elements are assessed and discussed is flexible and depends on the game and the perspective of criticism – in our case the purpose is the driving factor (see fig. 1). Grounded on the *SGDA Framework* we developed a questionnaire that de- and re-composes the aforementioned design elements to be outlined and exemplified in this paper, through the study of two *serious games* focused on social change: *Sweatshop* (2011, *Littleloud*) and *ICED* (2008, *Breakthrough*).

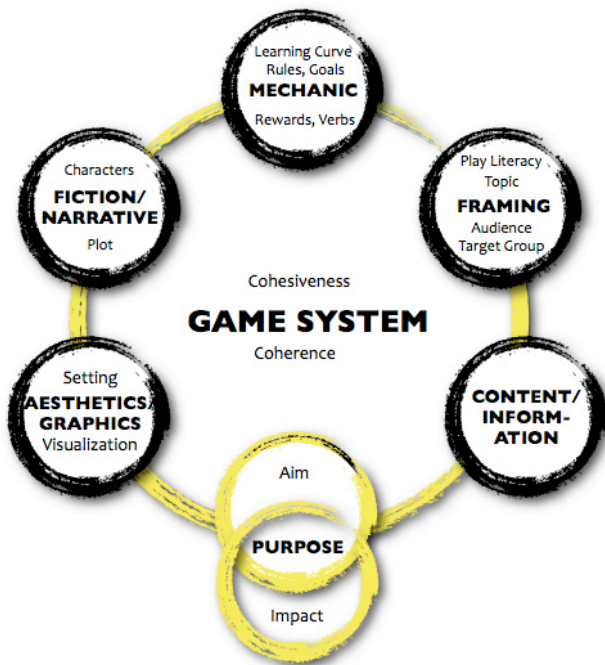


Figure 1: Serious Game Design Assessment Framework

3.1 Purpose

Our assessment of a purposeful game design starts with the investigation of the games' purpose to impact its players. Every game has certain goals and designers follow their explicit or implicit intentions when designing it. However, while in entertainment-oriented games the purpose is self-contained and focused on the gameplay experience, serious games and many educational games are explicitly designed to reach a specific purpose beyond the game itself. The purpose is reflected directly in the aim of the game and its topic, but also in the designer's intentions and their goal to impact the players in a specific way. In a nutshell, if a serious game has no impact on the player in a real life context, it misses its pivotal purpose. For this reason, the game's purpose acts as the driving force that shapes the dynamic and the coherence of the game system as a whole. It is critical to acknowledge that players bring their own intentions and purposes to the gameplay experience and might understand a game differently than intended by the designers [28]. Additionally, the configuration of the game system influences how the players read and experience the game. In this sense, the purpose can never be "transferred" directly as intended in its design, but the game structure impacts the possibility space provided by the game [5]. Consequently, the explicit intention and the purpose of the game need to be considered throughout the components of their design. To exemplify the use of our *SGDA Framework* we outline our findings in each element (3.1-3.7) of the holistic design and discuss the coherence and cohesiveness of the game system. We also focus on explicit statements regarding the designers' intentions and aims. In the following steps, our approach is exemplified by comparison of two serious games:



Figure 2: Sweatshop (2011)

The topic of *Sweatshop* (2011, Figure 2) – a free online game designed in 2011 by *Littleloud* – is manufacturing in relation to human exploitation. The purpose of the game is "to highlight the conditions of workers, but also inform as to the wider pressures that have brought this particular system into being, highlighting the role of clients, factory owners, managers and workers down the chain" [9]. The designers intention is to "make people think while they're having fun" [37], and to engage in the systematic problems of globalised capital and labor in an emotional yet playful way. The game does not aspire to "offer answers (...) as the complex issue" eludes "easy fixes", but the designers want to open up discussion and create "a conversation about the bigger picture." [9].

In contrast to *Sweatshop*, the intention and purpose of *ICED* (an acronym for *I Can End Deportation*) – a serious role-playing video game about immigration launched by *Breakthrough* in 2008 – is to “educate a wide audience about unfair U.S. immigration laws and practices, and deportation policies. The game’s core ‘message’ is that U.S. policies often deny immigrants due process under the law and fail to respect basic human rights that should be accorded to all people, regardless of citizenship status.” [13]. The purpose of this free online game is to “expose unfair immigration laws that detain and deport people without due process and respect for human rights.”



Figure 3: ICED (2008)

So, how are these purposes considered in the formal conceptual design of these two games? While most assessment tools do not differ between the games’ content, mechanics, fictional contextualization, and aesthetics, from an educational and theoretical point of view, these elements can be separated. As a first step, we analyze the content (2.2) and the mechanics (2.3) as follows:

3.2 Content & Information

The element *content & information* refers to the information, facts and data offered and used in the game [3]. For example, on a basic level, the content could relate to the stats of the players, the names of the protagonists or other supplementary information. In short, the content contains all the data and words provided in the game that are visible and made approachable to the players. Nevertheless, not all the content must be relevant within a game. While some games hardly use any approachable content, others are overloaded with stats or necessary data. The content of a serious game could be well presented, adequately formulated, “correct” or irrelevant, hard to access or insufficient, and in worst cases, just wrong and biased. In the past, serious game development was mainly focused on the quality and seriousness of the games’ content. The game mechanics were often simply built as an amusing topping to the serious content like “chocolate-covered broccoli”, which created a bad reputation of educational games as teaching instruments [8]. Packing good content in a little bit of (unserious) fun became inefficient. Although the content only makes sense framed in the game system – analytically it can be separated and examined from the context of the information:

Sweatshop provides in-game data on completed levels, on the money available to hire workers and their salary, on the time left to produce items, and stats on the quantity produced or ruined

items. In addition, the players can access data on their progression (labeled “My CV”) in which they see how many workers they hired, injured, killed, refreshed or upgraded, and how many features they bought. Furthermore, achieved trophies are visualized and a balance of the players “Karma-Status” is presented. After completing a level, additional text-based information about the problematic working situation in “sweatshops”, and about human exploitation in manufactories is provided in text boxes. For example [41]: “According to recent Cambodian living wage study, garment workers need 60 a month to support their families instead of the 38 the factory is paying them.”

In our second example *ICED*, the user interface provides the players with information about points of interest on a city map, stats on the “progress” in the levels, accomplishments of “general points”, and achieved freedom or risk points. Furthermore, the number of conceived “Myth & Facts” is tracked. The game constantly gives information and facts about immigration. For instance [7]: “Working ‘under the table’ using false ID or fake social security number can get you deported. Thousand of raids happen in the workplace each year resulting in thousands of deportations. Those who work without papers have few protections in the workspace, yet their low wages keep process down for all of us... is that fair?”

In both *serious games*, the given information is valid, easily approachable and fact-based. *Sweatshop* draws its information about sweatshops – that can also be accessed without playing the game – from organizations like *Labour Behind the Label*, *War On Want*, *Fairtrade* and *No Sweat*. *ICED* provides way more text-based content than *Sweatshop* that is drawn from more than 15 sources like *The United Nations Refugee Agency* to *National Immigration Law Center (NILC)* and *Human Rights First*. Yet, while *Sweatshop* focuses on neutral and brief facts, *ICED* involves judgmental expressions and predisposed language in their descriptions. In a next step the game mechanic of both games is assessed.

3.3 Game Mechanics

The question of what game mechanics are is complex and it is discussed extensively within the field of game studies [11, 33]. In short, game mechanics are the “methods invoked by agents for interacting with the game world” [38]. The mechanics involve the establishment of the rules that define the possibility space for operations in the game world [20]. In our framework, we also ask for the pivotal in-game goal of the game, the operation of the reward system, the main playful obstacles/challenges, the difficulty balancing and the win condition. A widespread technique used by game designers consists of translating game mechanics into *verbs* [42]. Verbs in games are actions that can be performed within the procedural restrictions provided by rules and algorithms. Moreover, some games might subvert common game design mechanics in order to challenge the players’ expectations and to question their modes of thinking [14, 15, 30].

The goal in *Sweatshop* is to produce as many faultless items as asked for (and as little insufficient items as allowed) with restricted amounts of time and with limited financial resources. As Nicholas Battjes [4] points out: “Mechanically, this is a straight-up tower defense game. (...) Since the towers are poorly-paid human beings instead of actual towers, they tire.” The rules allow the players to hire and maintain workers (if they have enough money to pay them) and to place them in the right positions in the

labyrinthine band-conveyor. What is more, they can make extra points by increasing the speed of the band-conveyor, or they can boost the workers environment by buying water dispensers, fans or by upgrading (educating) the workers. In 30 different levels with increasing difficulties and complexities, at 3 different factories the players earn points, get medals or lose contracts. The only control in use is the mouse. The basic verbs in *Sweatshop* are *hiring*, *managing* and *executing*. The mechanics also imply subversive elements: there are two different contradictory feedback-system implemented in the game. The players get points for good quality products produced in reduced amounts of time and with lower costs involved. The personal stats also track how the workers were treated determining whether the player is “evil” or “good”. Being good in one system (producing more for less money) also means being evil in the other (exploiting the workers).

The goal of our second example *ICED* is to avoid getting caught by immigration officers, and to gain points by answering questions without raising the risk level to get caught. By walking over green points (points of interest), the players are confronted by questions about myths or facts about immigration. By answering the questions correctly they gain points, by answering them incorrectly they gain risk points. With five risk points the immigration officers catch the players and send them to the detention center. If the players manage to find all the points of interest, and make the right choices, they are faced with a hearing at the end of the game and might be able to stay. If they fail, they are sent to the detention center. From there, if they misbehave, they are sent to “the hole”. Escaping from the center is only possible by voluntarily agreeing to deportation. The controls are: the mouse to navigate and the arrow keys to move. The difficulty level does not increase throughout the game. The basic *verbs* in *ICED* are *walking*, *avoiding*, *collecting* and *answering*. The game’s challenge is to choose the “right” answers, and to behave “well” as a citizen. The learning curve in *ICED* is flat, as there is only one difficulty level in the game. Moreover, finding points is trivial, in the same way the questions – as the main challenges in the game – are easy to answer, although they offer a narrative. There are no subversions in the game, except that even if the players succeed at the first two stages they still end up in the detention center... to just visit it. The fact that there is no “winning-state” in the detention center is perhaps a subversive element of the game.

3.4 Fiction & Narrative

While the *content* holds the provided information and the *mechanic* impacts the gameplay possibilities, the dimension of *fiction and narrative* introduces a fictional context. Without tapping into the broader discourse about whether games are narratives, fictional worlds or interactive stories, the *SGDA Framework* focuses on the created fictional space and how it relates to the games purpose. As Charsky argues [10], this fictional context involves “the setting, narrative, story, scenario, characters, back story, problem, and so on for the game play”. In similar cases, the game might not offer a linear story, or simulate or represent a specific issue, but provide a mechanic-based space that enables players to create their own stories.

Sweatshop’s plot can be described as follows: “Through a series of thirty challenging levels players must balance the unreasonable demands of Boss, the temperamental factory owner, and Boy, a gentle, hard-working child labourer. Together, the team must work to make the factory a success, supplying clothes to their

ever-demanding retail clients.” [18]. The player is a faceless “manager-in-training” overlooking the main production room, with its labyrinthine band-conveyor, constantly confronted with his boss’ demands, who himself is confronted with his boss’ demands (Fig. 4). Thereby, four different narratives are created. On one level there are the “telephone calls” between the evil factory owner and the “lordly” designers he is contracting for. These conversations are consequently framing the game goals that are reframed and communicated by the factory owner to the player, as his employee. On a third level, one of the hard-working child labourers offers his perspective about the work situation, and finally after each level the real life context of sweatshops is presented.



Figure 4: Sweatshop Graphics

ICED’s setting, in the first level, is an unidentified, fictional city with a large immigrant population (Fig. 5). There are five different characters to choose from, including a Gulf War veteran, a Green Card holder, a Japanese student, and an asylum seeker. Their background stories explain they are being denied due process because of unfair immigration laws. The plot introduces the player in the daily life of a person risking his deportation based on his actions. While walking through the town, the players interact with other non-player characters and make decisions based on questions they are asked. Besides the character-based stories, each challenge involves the player in a further narrative that should represent typical challenges illegal immigrants face.



Figure 5: A day in the life of an illegal immigrant in ICED

3.5 Aesthetics & Graphics

This component of the *SGDA Framework* refers to the audiovisual language (aesthetic characteristics, imagery, style preferences, artistic media, and the computer graphic techniques) conceptualized, chosen and used by the designers for the visualization, and the display of the elements involved in the game. The aesthetics and graphics define the overall formal aspects that frame the content (information), the fiction (the world and characters of the game), the framing (target group), the setting, and the mechanics (instructions, rewards) of the game. Since the aesthetics/graphics present the game to the player from the first image on, it plays a fundamental role in the introduction of the game's purpose and its impact on the player.

Coming back to our examples, *Sweatshop* is contextualized through a colorful cartoonish style intro-video animation, where the development cycle of the fast-fashion industry in sweatshops is shown. *Sweatshop*'s visual language dialogues and replicates clothing aesthetics with a combination of felt patches and seam lines used for the control buttons and digitally drawn sweatshop workers and imagery (Fig. 4). Every level starts with conversations in "speech balloons" placed next to the image of a working boy and an impatient boss. The game play is framed by catchy music and dark humorous comments from the boss.

In the case of *ICED*, the players move their characters through a 3D realistic environment while rap music plays in the background. The second location is a detention center where illegal immigrants are waiting for their deportation. In both cases, due to the intrinsic characteristics of the 3D graphics, the players or immigrants are able to walk through the streets of the city while they try to avoid the immigration officers that could appear anytime (Fig. 5). When the players are taken to the detention center the 3D architecture represents the oppressive environment effectively. The only contradiction that this level of detail presented is the lack of movement in the town such as with people and cars. The choice to use quite detailed 3D graphics to portray the town and the detention center appears partially in line with the target group.

3.6 Framing

Besides the five key design elements: *purpose, content & information, mechanics, fiction & narratives and aesthetics & graphics*, a further additional aspect is the *framing* of these elements in terms of the target group, their play literacy and the broader topic of the game. While the target group and the audience are often addressed as an important issue in serious games design, the play literacy of the target group is repeatedly overlooked. Hence, the play literacy of the players can essentially influence the gameplay experience. Is the target audience having trouble using the controls, understanding the user interface or recognizing the fiction of the game? What skills are needed? Are they too difficult or too easy to acquire? What genre of game is referenced and might cause particular expectations? Are the difficulty levels balanced in relation to the audience's needs? Generally, many *serious games* try to offer easy access to players, but often lack a balanced and engaging game play experience. Hence, well-balanced and attractive learning challenges are one of the most fruitful potentials of games to foster learning [19].

Sweatshop does not focus on a specific target audience, but the play literacy needed to master the game is very basic (comparable with most casual games (e.g. Facebook games)). The difficulty level increases from level to level, and it is very well balanced. Failing a level does not have consequences on the overall progress, and in consequence fosters replayability. The acquired skills to manage the workers are used in the further levels. The

game does not include an assessment tool or educational materials and is – to the knowledge of the authors – not part of a further research study. The topic of the game – human exploitation and work ethics in sweatshops – is addressed in an almost neutral way. Contrariwise, *ICED* targets high school and college students. It comes with a curriculum for high schools and community groups. This target-group orientation is obvious in the game mechanics (cf. 3.3) but also in the multiple choice test at the end of the game that leads to an empirical follow up study of the games' impact [13]. Besides the questionnaire, teaching materials are available for download. *ICED* learning challenges rest in the content, not in the game mechanics. And although the game's audience is obviously addressed in the content and fiction, the appropriateness of the 3D-shooter-style navigation for inexperienced players is questionable. Due to the absence of challenges and the missing balance of difficulty levels incitements for replays are lacking.

3.7 Coherence and cohesiveness of the game system

The pivotal function of the *SGDA Framework* is not only to decompose each of the design elements, but also to examine how they holistically relate to each other and to the game's purpose. The *SGDA Framework* studies the game system as an integral entity that encircles the design elements to shape the game play experience. Shortly, one can argue that in games the whole is greater than the sum of its parts – but if the system is not cohesive, the whole can also be in a systematical conflict [24]. The holistic serious game design assessment requires asking how the game's purpose is reflected in the *purpose, content & information, mechanics, fiction & narrative, aesthetics & graphics* and the *framing* of the game. Next, the relation among the game's content and its fictional contextualization and mechanics is examined. Finally, the coherence and cohesiveness between the narrative and the mechanics in relation to their formal conceptual design is questioned. This holistic design-related evaluation is uncommon within the *serious games* research field. Thus, it offers a potential for a critical discourse about the strength and weaknesses of a serious game:

How does *Sweatshop* present a coherent and cohesive game system? The purpose of the game to offer a playful environment – where the systematic problems of globalized capital and labor are represented without giving simplistic answers – is coherent with the content, the narrative and the core mechanics of the game. The game mechanics and the context drag the players into the development-cycle of sweatshops. Although the game offers informative content about ethical issues, the game does not deliver simplistic answers but delves into the core problems of global mass production. The game raises essential ethical questions concerning child labor and human exploitation. Yet, it also shows the business perspective and thereby offers a meaningful discord without solving the conflict for the players. The central verbs of the game (*hiring, managing* and *executing*) meet the intentions of the designers and suit the fictional contextual framing of the game. The game tries to mirror the complexity of the problem with sweatshops (global economy vs. human exploitation) and therefore uses a subversive design element represented via two contrary feedback systems. The players can focus mainly on the business success, thereby exploiting the workers, or they can try to increase the workers' health and security but consequently decreasing profit. Sweatshops are based on an unfair system in real life. Similarly, the game is also based on an unfair system. *Sweatshop* renders a challenging, reasonable, cohesive and coherent formal conceptual design that relates to the designers'

intentions and to the purpose of the game. In consequence, it is a perfect example of what serious games – in terms of their design – are capable of. What impact the game has on the players, and how it influences their thinking and acting regarding real sweatshops is a question that needs further investigations. According to our analysis based on the *SGDA Framework*, *Sweatshop* is a promising serious game that deserves future empirical studies.

So, how about the coherence and cohesiveness of the game system behind *ICED*? The purpose of *ICED* – in the words of the designers – is to expose “unfair immigration laws that detain and deport people without due process and respect for human rights” [7] which is met in one part of the game mechanics: when the challenges are avoided by voluntarily agreeing to deportation. This mechanic relates to the content, the fictional context, and the aim of the game giving the player a sense of what immigration laws are about. Leaving the country is the only easy option the player has – all other options are complicated and frustrating. Likewise, the option to choose different characters and show their situations suits the purpose of the game. The core activities such as *walking*, *collecting*, *avoiding* and *answering* quizzes relate to the serious *content* of the game, but – and here a first incoherence sets in – not to the *fictional* and *aesthetic* dimension, or the *framing* of the game. The emptiness of the environment creates a conflict with the fiction, which is based on the idea of being in a big vivid city. The *fictional* and *aesthetic* contextual framing of *ICED* lacks coherence and it is in conflict with the game mechanics. Although the game’s narrative involves everyday life in the American society, the city presented in the game is quite empty. In a similar manner, in the deportation camp, the presence of other non-intractable immigrants is only heard but it is not visually rendered.

While the fictional context of the game attempts to place the player in the shoes of an illegal immigrant within his or her everyday life, the aesthetic experience of solitude in the game is irritating. Consequently, the daily life of illegal immigrants struggling to get by – under fear of detection – is not mirrored correctly. The pivotal incoherence lies in the formal conceptual design of the game itself, in relation to its purpose. The intention of the developers to expose unfair immigration laws results in conflict with the main activities of answering and collecting simplistic answers. In other words, answering multiple-choice question does not put the player in the position or situation of an illegal immigrant – even if the content is educational and valid. The implicit unintended “message” the game enacts is that the only way to end deportation is to stay out of trouble, to do good deeds for the community, and to avoid immigration officers. In fact, this inherent “message” is counterproductive and not factual. In real life, being “good” may not have any impact on whether an immigrant is deported or not. Additionally, the questions of the game are too judgmental and biased to offer real challenge. In short, the fiction of *ICED* relates to the purpose of the game and to its content but conflicts with its core activities (verbs) and results in trouble with the game system. Even if the game was evaluated and claims to have impact on the players [13], from a formal conceptual perspective on its design, the game yields incoherent messages and can easily be misinterpreted. Clearly, the lack of skills needed to master the games’ main challenges leads to the hypothesis that only the content of the game offers learning challenges. Hence, empirical studies focusing on the game would have to consider the conflicting elements and identify the measurable learning outcomes.

4. CONCLUSION

The central finding from applying the *SGDA Framework* is that a structured discussion about the serious game design elements in relation to the games purpose is possible, and offers constructive insights. Therefore, it can be argued that the purpose of the game needs to be coherently reflected throughout the formal conceptual design of the game, otherwise the system is conflicting and not cohesive. The *SGDA Framework* proposes a constructive framework to assess serious games, but it still leaves room for different interpretations and should be understood as a first step leading to further discourse. The framework can be used as a constructive structure for additional (serious) game criticism, assessment and evaluation and it might even structure design and prototyping processes. In addition to the relation between the games’ purpose, content, fiction, framing, aesthetics and mechanics, their connection to the play literacy of the game’s target group and the implemented learning curve need to be reflected.

We argue that incoherence and missing cohesiveness in purpose-based games are not only signs of inadequate game design, but also hinder necessary follow-up research. If serious games are designed to be purposeful by design and intend to impact their players, their purpose needs to be considered in all design components. The designer, creative director and executive producer of *Sweatshop*, Darren Garrett, states in a recent interview with *Wired* [9], that serious games can facilitate or prevent an impact on their players:

“Games are just a medium, so can be used well or poorly to discuss a serious topic. However, I believe they have the capacity to be one of the most effective ways to discuss a serious topic as they cast the player in the role of active participant. (...)”

Garrett argues that even if games allow different experiences than other media forms, they also follow distinct restrictions and limitations in their design. A serious game is a medium that – if well-designed – can present unique learning opportunities. Thus, the question how players are recontextualizing effective playful experiences in their lives is one yet unanswered [28]. Putting effort in researching the impacts of these games is a promising challenge that is worth being tackled by student, scientists, educators and game designers. Serious games are intended to be purposeful by design – yet these good intentions need to be met in terms of its design and verified on an empirical basis.

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