Teaching "Applied" Game Design

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Abstract

It is common for student and entertainment game designers to have a prejudice towards serious games, because the goals of a serious game seem to compromise the designer's ability to design a "fun" game. However, applied game design may present an opportunity for design innovation and design that is "more than fun". This paper addresses an approach used to educate game designers about serious game design, which combines theory and conceptual design tools to help minimize the complexities of serious game design and maximize the creative freedom of the serious game designer.

Keywords: Game Design, Serious Games, Education

1. Introduction

The HKU, University of the Arts Utrecht in the Netherlands has offered a game design and development course since 2002. An aspect of this curriculum has always included projects requiring designers to 'apply' their design skills to create games with a purpose other than pure entertainment. These kinds of games are what HKU University of the Arts Utrecht refers to as "Applied Games", a term meant to include games also known as serious games, persuasive games, games for health, advergames, *etc.* [1, 2]. Applied games are more complex to design than the typical entertainment games due to the need to blend and balance factors (i.e. game-play experience, theory, pedagogy, sustainability, etc.) which influence the chances of the game achieving its purpose [2, 3, 4, 5].

Game design students, during their four-year education at the HKU University of the Arts Utrecht, will design and develop several applied games. These game projects are all situated to connect students to real-world clients with real-world goals. Students do not have the luxury during these projects to become subject matter experts in the selected domain (*e.g.*, safety, defense, education, health, *etc.*). Nor is it ideal to train domain specific game designers, since a game designer in general is capable of designing all kinds of games [6]. Applied game design is the name that given to the design practice which emphasizes how designers connect game design activity, game design principles, methods and processes to a meaningful application in real-life [1].

It takes combined practice, theory, and instruction from an experienced game designer to educate game designers [7]. And there is evidence that applied game designers learn through client-based development projects supported by experienced mentors [8] [9]. However, the chosen theory used to support game designers in these projects come from the entertainment industry [9] even though the amount of research on applied games is rapidly growing and readily available. The literature on applied games and their design come from academic perspectives on cognitive psychology, pedagogy, literacy, and computer science [4, 10, 11, 12]. It could be that the relevant theories, frameworks and models from these sources are often difficult for game designers to distill knowledge from. As the research is typically

meant to validate the effects of games, demarcate target audiences, analyze applied game elements, or understand how games map to a specific domain or affect.

The aim of this paper is to create awareness for the didactics in the role of educating game design students in applied game design. Central to this discussion is finding ways to minimize the complexities and maximize the creative freedom of the designer when designing the play experience of an applied game. Described in this paper is course content used in an approach to educate game designers about applied game design. These theories and tools represent a game design perspective taken to make applied game design theory accessible and relevant to students. The approach begins with the Vitruvius triad, a philosophy towards the design of applied games, followed by a way to categorize applied games by tactical form and ends with the AGD (Applied Game Design) Scope Model method, a conceptual design tool and method used for designing applied games.

3. Applied Games

'Applied game' refers to games designed with a purpose other than entertainment and refers to the multitude of games with applied purposes (i.e. training, education, exercise, persuasion, health, human computing, etc.). Serious games have also been defined similarly, but too often the term describes games designed for educational and training purposes. 'Applied' refers to the tactical use and usefulness of the knowledge and skills acquired from the game activity. It also refers to the way a game in certain contexts is embedded [1].

Currently the discourse and knowledge concerning the analysis, communication, design and development of applied games is growing. Some aim to better understand applied game design analysis by creating frameworks which offer meta perspectives on applied games, i.e. the need to blend pedagogy, game design and technology [3] or demarcate serious game design as meaning, play and reality [4]. Some sources provide insight into the processes behind applied game design and development by recounting the development process from concept-to-final version [4, 11]. Others identify game design patterns used to communicate paradigms that create good learning principles, desirable gaming effects, or game mechanics already successfully deployed [10, 13]. Lastly, some propose models that explore how game design can connect game design principles to persuasive rhetoric, pedagogic, therapeutic, and cognitive results [5, 11, 12, 14].

2. Teaching Applied Game Design

2.1. Formal Education for Game Designers

A game designer must become an advocate for the player, whose focus is the player experience [16]. He or she creates play from his or her understanding of complex systems and their underlying relationships and rules. A designer works with formal elements (*i.e.*, systems, rules, internal relationships, objects, boundaries and outcome), and through a series of design decisions eventually creates a game system that determines the player's available choices, actions and ultimately the player experience [16]. A game designer is not limited by technology or genre, and capable of designing all kinds of games [6].

An education to become a game designer requires combined practicum, theory, and instruction from an experienced game designer [7]. Practicum must allow students a chance to gain experience through game development. Through practicum a student should learn about communication, teamwork, process, and creativity. Communication and especially listening are important in order to develop into a professional [17]. Furthermore any additional interests and knowledge (*e.g.*, history, psychology, public speaking, management,

anthropology, creative writing, *etc.*,) can only add positively to the anatomy of a game designer [17]. Game design practicum can range from digital [8, 9] to non-digital game projects [7]. Game projects are important because they can teach students about having real-world clients [9] and finish their games [7]. Typical game design theory is derived from books like Schell's The Art of Game Design: A book of lenses [9] or Fullerton's Game Design Workshop: Designing, Prototyping, & Playtesting Games.

HKU University of the Arts Utrecht also structures its game and interaction school's curriculum around practice, theory, and instruction from games industry professionals. Theory includes such subjects as game design, interaction design, audio design, art history, cognitive theory, *etc*. While somewhere between theory and practice includes development oriented classes *i.e.*, drawing, 3D Modelling, Programming, etc. Students take part in six game development projects over the course of their four-year study. Lecturers are primarily professionals from fields related to the interaction or games industry except a few experts from the humanities specializing in game studies. Lectures with the professional backgrounds are typically the supervisors of student projects and teach interaction or game design theory classes.

Before a discussion about applied game design theory can begin, it is important to cover the challenges that face teaching game design. One the primary challenges is that game design theory is often not valued as a theoretical study and often discounted as "kid's stuff" or "it's just getting a few ideas" [7]. It is not uncommon to find that there are approaches to teaching game design that allude to 'game design' as something you learn through 3D modelling or programming, and game design theory is about writing pitch and design documents [7]. However, learning these video game development skills is not learning about game design. Games and their design are not dependent on video game genre and computer technology, but games transcend this medium [17]. Teaching students is another challenge, as they are often impatient and want to do "something practical", which means theory taught in a game curriculum must offered to students at the correct time (*e.g.*, after game development). This means that game designers need some design experience to make use of game design theory, and will not understand the theory completely otherwise [7].

2.1. Applied Game Design for Game Designers

New challenges arise when teaching applied game design theory. One example is the demand for the theory from the students, who tend to focus on entertainment games. This lack of interest in applied games is always surprising considering that about 63% of game companies in the Netherlands make applied games [18]. In general students are adverse to the idea of making applied games, which the general myths [20] about applied games no doubt contribute. Perhaps the biggest challenge comes from the myth that "applied games aren't fun", and getting students to try redefining their notion of "fun". Students often define fun purely based on their limited experiences with video games. This leads to mistakes in applied game design when game designers try to repurpose entertainment genre paradigms to an applied purpose [21]. Another issue with applied game design is the source of the theory, which mostly the result of academic research. The purpose of which is mostly for creating knowledge about applied game use in the domains, *i.e.*, health, education, defense, *etc*. Compared to popular game design literature (*i.e.* The Art of Game Design: A book of lenses, *etc.*,) and journals like Gamasutra[1] the relevant design information is not accessible to a game design student.

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[1] http://gamasutra.com/

"Quality is maximized by leaving the design of game-play up to game designers and the design of learning up to teachers [15]."

Included in my regular game design class are lectures on applied game design, which I give in a workshop-like format. The theory I have selected to use in my applied game design lectures, which is describe in more detail in this paper, is research that I have simplified for practical for use as an applied game designer. The ideology behind the theory is to make what appears complex accessible to the game designer, so that the game designer can focus on what he or she is good at— designing games. This means that the game designer cannot be expected to become a subject matter expert or didactic expert, rather the game designer should remain the expert on creating the player experience. For this reason my instructional goals are:

- To give a means for students to critique applied games.
- To give a way to categorize games according to their design and not their domains or genre.
- To give a design tool, which is used to guide design choices, spur design research, and support argumentation for design choices.

4. Vitruvius

The approach used towards providing a general theory of applied game design to students starts with a philosophy inspired by Vitruvius's three guiding principles towards architecture. Marcus Vitruvius Pollio was an ancient Roman author, architect, and engineer and is known for his multi-volume work entitled "De Architectura". Vitruvius was responsible for establishing the core principles for all ancient Roman architecture through the triadic principles of utilitas, firmitas, and venustas. Repurposed for applied game design, the philosophy is to encourage critical design awareness and offer a perspective on balancing an applied game's utilitas (purpose), firmitas (sustainability) and venustas (game-play experience) [2]. Utilitas or purpose is when a game fulfills its tactical purpose; Firmitas or sustainability is when the game is properly embedded in the context, obtainable or available to users and players, has a service or syllabus designed around it, and aims to create a perceivable impact in the chosen domain; Venustas or game-play experience is when the game provides a meaningful holistic experience (*e.g.*, graphics, sound, game-play, *etc.*,) for the player.
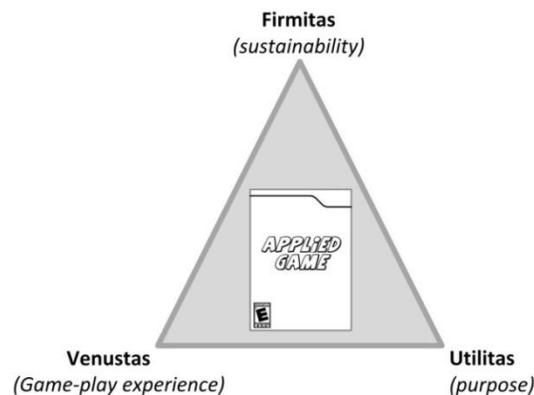

Figure 1. The Vitruvius Triad for Applied Game Design

The Vitruvius triad (utilitas, firmitas and venustas) is a framework created to analyze applied games [2]. Through an analysis the potential impact of an applied game is critiqued. Because the analysis critiques the potential for impact, two applied games from different domains, game-play and purpose is comparable. For example, two seemingly different games like Foldit[2] and America's Army[3] both which have notoriety in their respective domains. Foldit is an online puzzle video game developed by the University of Washington's Center for Game Science in collaboration with the UW Department of Biochemistry as a part of an experimental research project. America's Army is a video game developed by the United States Army and released as a global public relations initiative to help with recruitment. What do these two games gave in common? And what makes them 'good' applied game? Using the triad, some resemblance is quickly revealed. Do the games successfully fulfill their purpose? Are the games accessible to the target audience and have an active player-base? Do the games offer these players a meaningful player experience? Using questions like these, a game's utilitas, firmitas and venustas are explored in detail. Using entertainment game (*e.g.*, quality of game-play, story, graphics, and sound) standards to judge these games would disregard the games purpose. Separating the games by domain would never find these two applied games compared. Using validation of the content and transfer to judge the games would disregard the intrinsic motivation the game should offer the player.

The triad can also be used by applied game designers as a communication tool since an applied game is rarely developed without the input from subject matter experts (*e.g.*, teachers, doctors, scientists, etc.). A known challenge to applied game design and development is good communication with the subject matter experts [20]. The triad is also meant to facilitate communication between game designers and subject matter experts by identifying how elements combine to arrive at a (good) applied game and creates a dialogue about how investing in one of the three will not yield a successful game [2].

5. Tactical Forms

5.1. A Definition

"Application (…from the term applied game) refers to the tactical use and usefulness of the game activity outside the domain of the game itself. In other words, application does not so much refer to the game itself, but rather to the way the game is deployed in certain contexts [1]."

In this approach towards categorization of applied games, we categorize the game by *tactical form.* 'Tactical form' is used to describe the way an applied game is designed for its deployment in a certain context. "Tactical" refers the design considerations about the game's deployment in a certain context. The "form" refers to design patterns used by the game for deployment in a certain context. As frameworks, *tactical forms* are used to educate game design students about identifying applied game deployment paradigms and their structures. This is to guide students to disregarding the domain specific categorization. The concept of a tactical form is loosely derived from Duke's [22] "game objectives" or purpose of an applied game. Purpose is most often associated with an applied game's content (*e.g.*, math, exercising, crisis training, data collection, *etc.*). Duke eventually describes four purposes that relate to the tactical "use" of an applied game:
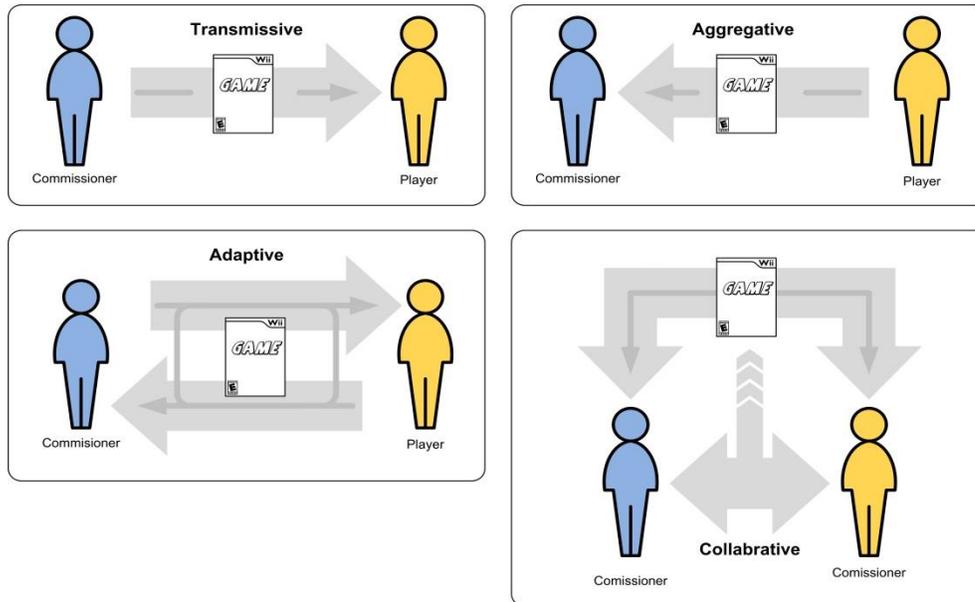
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[2] http://fold.it/portal/
[3] http://www.americasarmy.com/

1) Dialogue, the game stimulates communication about complex topics;
2) Project, the game aims to inform, educate or train;
3) Extract, the game takes opinions or information from a players;
4) Motivate, the game is used to motivate players, but is always coupled with the before mentioned purposes.

5.2. Transmissive, Aggregative, Collaborative, and Adaptive

There are four tactical forms that an applied game can adopt as its design for deployment to a certain context (see Figure 2). Each tactical form helps meet the main purpose and goals of a commissioner. Each tactical form includes two critical roles: 1) the game's commissioner, whom represents an organization or person who determines the primary purpose of the applied game; 2) the game's players, whom represents the target audience that will 'play' the game. Finally, the model includes the game, which is represented at the center of the model between commissioner and player to represent its role as facilitator. The game as facilitator facilitates the transfer of information, instruction, rhetoric, cooperation, creativity, *etc*. Next, the tactical form provides a map to how the game facilitates the commissioner's aims.

Figure 2. Four Tactical Forms of Applied Games

The first tactical form (see Figure 2 top-left) is what I term as *Transmissive*. Commissioners use the game to attract and then engage players to 'transmit' skills, knowledge, rhetoric, therapy, *etc*. These are games typically called *serious games* (*e.g.*, America's Army, Re-Mission, ABCDE Sim, Darfur is Dying, McDonald's Video Game, *etc.*), and used for many purposes in many different domains.

The second tactical form (see Figure 2 top-right) of an applied game is what I term as Aggregative (or gathering). Used in this form the game attracts and engages players to gather knowledge, information, user-generated content or human computing. These games were first called games with a purpose (*e.g.*, Foldit, Phylo, ESP game, Google Image Labeler, *etc.*) and

used in the domains of science and accomplishing tasks computers cannot (a.k.a. human computing).

The third tactical form (see Figure 2 bottom-left) of an applied game I term as Adaptive. Commissioners use this tactical form to interact with players through the game, which allows them to adapt the game in order to facilitate a transmissive or aggregative purpose. An additional aspect of this tactical form requires a user or another kind of player (not the game's target audience) that uses the game as a tool. The new role, defined as user or user-player, manages or plays along with the intended target audience to accomplish the purpose of the game. No term has yet been coined which describes an applied game using this kind of tactical form. An example of a game that employs this tactical form would be Moodbot[4], which is an online multi-player game for psychiatric healthcare developed by HKU University of the Arts Utrecht, the mental healthcare organization Altrecht and back-end developer Ippo. Moodbot provides patients and healthcare workers in-game communication by allowing patients to share their mental state. Healthcare workers to respond are then able to respond or set course of action personalized for that patient.

The fourth tactical form (see Figure 2 bottom-right) is I term as the *collaborative* tactical form, and aims to create dialogue between participants through the design and development of a game. Examples of these games are difficult to find since their usefulness is their creation, while some simulations create starting point for a 'game' to facilitate policy making (e.g. Climategame[5]). Duke [22] considers this form the "prime purpose" of applied games, and meant to increase dialog about complex and future-oriented systems.

6. AGD Scope Model

6.1. 2CaT Analysis

The AGD (Applied Game Design) Scope Model is not meant as a way to frame observations on applied games or the practice of applied game design. It is a practical design tool (or process) to be used by a game designer to "design" applied games. The scope model is created at the beginning of a project when the game designer undergoes a process to analyze the design challenges. The results of this analysis are then connected to the design of the applied game by the game designer.

The analysis, referred to as 2CaT (C^1ontent, C^2ontext and Transfer) (see Figure 3), aims to organize the design challenges as parameters related to the content, context, or transfer. To be able to identify these three factors the following questions need an answer: who, what, where, when, why and how. Once these questions have been answered the game designer has a quick-scan that can use for the design of the applied game in question.
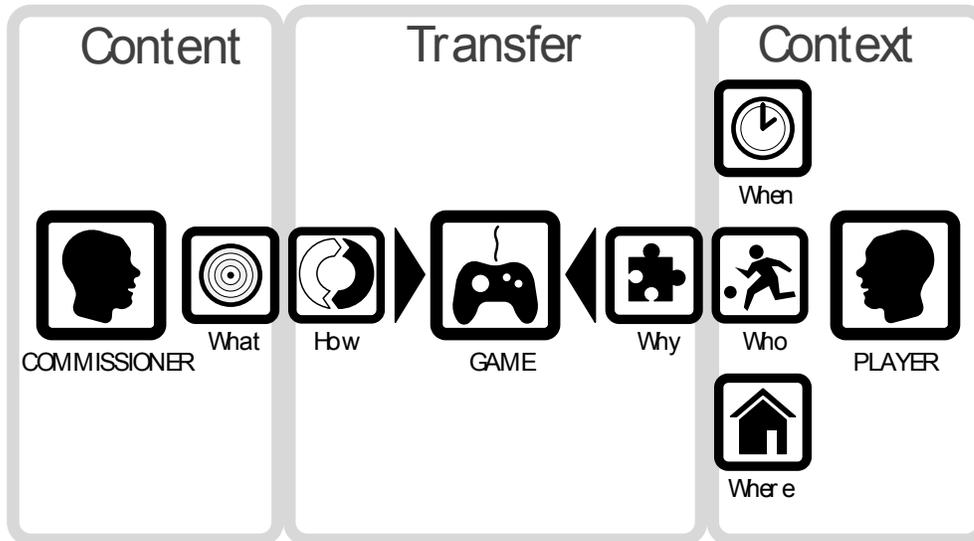
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[4] http://moodbot.nl/
[5] http://climategame.nl/

Figure 3. The 2CaT Analysis

6.2. Content

The *content* corresponds to the commissioner of the game, who also acts as or provides a subject matter expert. In the2CaT analysis *content* defines "what" the game is about, or what it is to accomplish. Depending on what is defined as the content (e.g. persuasive, educational, therapeutic, motivational, etc.) will determine the aim of the game design [3] [5] [11] [23]. Simplified for the quick-scan, this becomes a question formulated with— *what*. From which a series of questions can be formulated to determine the parameters of the purpose of the game: What is the purpose of the game? What does the game need to achieve? What are the takeaways for the player? What should the game not do?

6.3. Context

The *context* corresponds to the player (or target audience), who determines if the game will achieve its purpose. In the 2CaT analysis *context* is defined by "who" will play the game or use the game as a tool, "where" the game is played, and "when" the game is played. In terms of game design context pertains to the level of complexity, length of game sessions, re-playability [24], and strategies that consider how the game can fit the target audience's environment [5]. Simplified for the quick-scan this becomes questions formulated with— *who*, *where* and *when*. From which a series of questions like the following can be formulated to determine the parameters of the target audience: Who is the end player(s) or user(s)? What do you know about their attitudes, abilities, (dis)likes, *etc.*? The location or environment: Where will the audience encounter the game? Is the location a logical place for a game to be played? Does the location fit with their habits? Do they have access to the game from their location? And the time: When do the players have time to play? How much time do you expect the player to dedicate to the game? How much time does the player need to play to achieve the goals of the applied game?

6.3. Transfer

The *transfer* corresponds to both the commissioner and player. The commissioner helps to identify the method or theory (*e.g.*, psychology, sociology, didactics, political science, *etc.*,)

that structures the content for the player, while the player determines if the game-play experience is meaningful. In the 2CaT analysis *transfer* is defined by "how" the structure of the game accomplishes the purpose (*content)* of the game, and "why" the game will motivate the player or offer a meaningful experience. In game design this concerns how games reflect reality [4] [11], structure good learning [10] or offer meaningful game-play actions and roles [25]. Simplified for the quick-scan this becomes questions formulated with— *how* and *why*. From this a series of questions like the following can be formulated to determine parameters of the transfer method: How is the goal of the project accomplished without a game and what are the most important principles of this process that need incorporation into the game? And the possible game verbs: Why is the game interesting to play? What verbs or roles can (or cannot) in relationship to the *method*? What verbs are best suited to achieve the *goal* of the applied game?

7. The AGD Scope Model in Practice

The HKU, University of the Art Utrecht's innovative pilots[6] Carkit, Burgemeestergame (Mayor Game), Dream, Rampmeester (Master of Disaster), and Moodbot were all designed with the help of the AGD Scope Model. And student projects under my supervision have also used the Scope Model since 2006. The AGD Scope Model is a process of selecting a concept, where a 2CaT analysis sets the parameters to determine the merits expected of an appropriate applied game concept during the concept phase of game development. The 2CaT analysis part of the Scope Model, if used rigorously, can find continued use well into the game design and tuning phases of development. An AGD Scope Model lecture and a worksheet (see Figure 4) are given to students to support their use of the process. The following list describes the process described by the worksheet:

1. Create the scope model by answering the 2CaT questions (see Figure 3);
2. If 2CaT is missing answers to its questions, they should be answered by conducting design research;
3. Present the result of the 2CaT answers as design parameters to the commissioner for feedback and confirmation;
4. Develop game concepts (e.g. brainstorming);
5. Use the design parameters from the scope model to decide if the game is suitable;
6. Present the concept(s) to the commissioner using the scope model to argue their merits.
7. If needed, repeat step 4 through 6 to until a suitable game concept is selected.

Furthermore, in step 5 the game designer may want to include a well know entertainment game that seems highly unlikely as being an acceptable concept (*e.g.*, Pacman) as a control, which will help to validate the process.
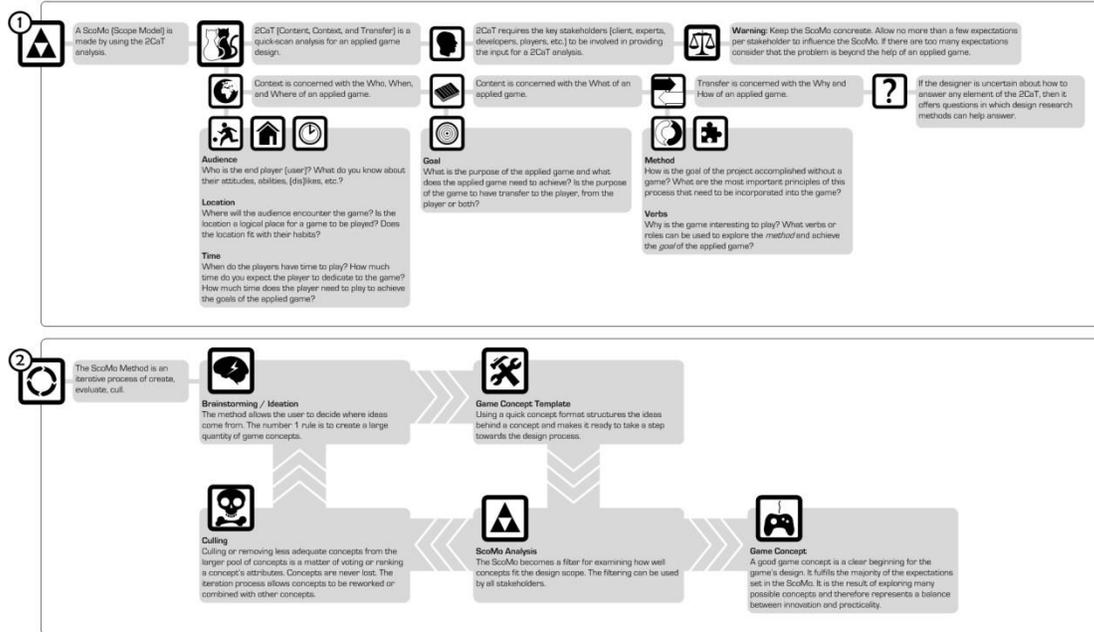
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[6] http://gi.hku.nl/

Figure 4. ScoMo Worksheet

Additional observations of this process include:

1. The need to encourage game designers to explore alternative game solutions, while avoiding the temptation to immediately mirror reality (*i.e.*, simulations);
2. Having game design students look for game-play experience instead of "fun" based on entertainment game paradigms (*e.g.*, genre, game mechanics, length of play, *etc.*,);
3. Helping game designers avoid information overload brought on by too much research;
4. Avoid of content driven design by setting design parameters and not features;
5. Regulate communication with the commissioner using design parameters.

8. Conclusion

In this paper I have introduced an approach used to educate game designers about applied game design, which includes a philosophy towards applied games, an overview of tactical forms, and a conceptual game design tool. Central to the theme of this approach is the need to minimize the complexities of applied game design and maximize the creative freedom of the game designer. The goal is to create enthusiasm among students about the possibilities and challenges offered by applied game design, which could result in future applied games having better game-play experiences.

Currently there is little discourse concerning game designer education, let alone applied game design education. The approach presented in this paper is meant to encourage educators and researchers to share their own approaches to applied game design education. I believe it can only benefit the future quality of applied games to have game designers that have number of philosophies, theory and tools to aid their design. However, awareness that certain flaws can exist in this kind of design knowledge is necessary. First, the design knowledge is iterative and changes as new insights are gained. Secondly, it is inevitable that each designer will choose her or his own approach to designing games. The kind of knowledge presented

here can only function to support a future designer, but could never claim to offer facts or secret recipes. Ultimately, the intention is to open discussion about the kinds of knowledge and skills an applied game designer should have.

Acknowledgments

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