Integrating Serious Content into Serious Games

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ABSTRACT

This paper addresses the integration of training content into serious games. Many possibilities exist for how to approach this process, but there are also many opportunities and consequences afforded by these various approaches. Prior literature in the field gives us some sense about how to approach them, but much of this literature is based on theory in instructional systems or game design separately. Serious game designers utilize some of this theory, but also rely on other methods and processes for completing these games. This practitioner perspective is the one we adopt in this paper. This paper reviews current approaches suggested in research on serious games, derives what that research means for studies of serious game practice, and describes a study of how learning content is transformed in serious games. This paper finds practitioners have a learning objective focus to game design aiding their choices of the right mechanics and representation, balancing fun and education, and evaluating the game. We find serious game designers also must deal with a number of organizational and other exogenous factors as well. This study provides an important contribution to the literature on serious game design from this practitioner perspective.

Categories and Subject Descriptors

K.3. [**Computing Milieux**]: Computers and Education

Keywords

Serious games, designer, training content, practice

1. INTRODUCTION

Serious games walk a fine line. They must be entertaining to keep users engaged with the training. Simultaneously, they must ensure their players effectively learn so that the knowledge and skills transfer back to the workplace. Certainly, other training media must also deal with this balance, but serious games are unique because unlike passive media, such as training videos, serious games engage the player interactively. Hence, the effectiveness of serious games lies with the integration of training content and game design. It is the responsibility of serious game designers to address how that content will be integrated into the game.

This paper inquires into this process of integrating serious content into serious games. Both the topics of instructional and game design have been traditions from which serious game designers draw on [see 2, 12 for foundations in instructional design and 5, 10, 15 for foundations in game design, while 6 demonstrated the value of the latter for the former]. There is also research explaining the unique challenges serious game design poses from both a learning and design context [14; 17; 18]. The integration of serious content as a domain of research within serious games has been investigated as well [e.g., 7, 8, 19], but it has been from an academic not practitioner perspective.

Just as there are limitless ways games can be designed, there are as many ways content can be integrated. A designer may simply wish to embed the content directly around other game activities, which is called exogenous game design [19]. A problem-based approach would ask players to deal with a simulated real-world situation and reference training materials in the pursuit of in-game achievements [16]. Another approach would be to map aspects of the content to be learned to mechanisms within the game (e.g., negotiating with factions in a game could require understanding the real world policies between organizations) [8; 11]. A constructivist approach might be to embed the player into an ongoing narrative leveraging the content, but also expect players to make their own connections and interpretations about that content [4, 19].

Even within each of these general approaches, various aspects of social interaction, story, game mechanisms, and outside resources can be leveraged to achieve designers' training objectives. However, these are all approaches where the design ideas originate from instructional systems design. Serious game designers are already addressing these problems and have their own ways to solve them. Serious game designers may have a variety of backgrounds, which may or may not include formal training in instructional design theory. Yet, they have their own success stories of working with serious games and approaches for integrating content in games effectively. Without this perspective on practice, serious game researchers rely on instructional methods, which may or may not be suitable for serious game design. We seek to understand the approaches professionals have been taking and the value these approaches may engender for the field more generally.

This paper addresses the professional practice of serious game design. The paper specifically focuses on how training content is integrated by professionals. The next section analyzes the literature on integrating content into serious games, deriving a number of insights from this collection of articles. The following section describes the

methods and analytical procedures for the study. Insights from the literature review are used to construct a framework for organizing data collected and as a preliminary analytical tool from which we search for themes and patterns. We then reveal some of the findings for our interviews with 11 serious game designers. We conclude the paper with implications for the field of serious games more broadly linking issues of pedagogy with practice and summarizing the main points of this article.

2. LITERATURE ON SERIOUS GAME CONENT INTEGRATION

While serious game design research as a whole is bourgeoning, many conceptual issues are still being uncovered. One area with a large impact for the viability of the field is that of content integration into serious games. The variability and interactive nature of games is what makes the idea of integrating content so much more complex than in other media. While translating training objectives to a didactic video and constructing an "interactive" workbook for students to practice their conceptual knowledge of course concepts presents its own unique issues, the complexity of games and the limitless potential of what a game can be makes the integration of content into serious games a specialized skill in itself.

[7] approached this problem from the perspective of three models surrounding the learning situation: Keller's ARCS motivation model, Gagne's Events of Instruction, and Bloom's Taxonomy. These models, the authors stated, match the traditional progression-based model of achievement in video games. These models can also be reinterpreted to provide a framework for instructional content in serious games. This framework referenced three levels at which it applies, including the game, unit, and individual decision levels.

[19] understood the process of content integration from the perspective of player performance. He argued from a perspective of *learning by doing* where players are the authors of their learning experiences, while designers, "'write' the parameters for [those] player[s'] experience" [19, p. 21]. The article highlighted the importance of agency, interactivity, and the social dimension of gameplay. The strength of learning then can be seen as the consequences and decisions within the game space as well as how those decisions relate to the broader context of the educational activity, particularly in the social realm as he points out. Furthermore, [19] distinguished the categories of exogenous games, which were didactic in nature, from endogenous games, which were meant to be arenas of meaning negotiation and construction for players.

These categories of games are also addressed in [8]. Here, the categories of exogenous and endogenous games were addressed from aspects of their extrinsic and intrinsic integration of content respectively. Extrinsic integration described using gameplay to surround training experiences where the two were relatively independent of each other and do not impact one another. Intrinsic integration described interweaving the content in the mechanisms and features of the game. This integration aligns closely with the learning by doing approach through cycles of gameplay performance argued for in [19]. [8] found very little

evidence to suggest intrinsic integration was more effective from an instructional standpoint than extrinsic integration. He did find some evidence of the motivational power of intrinsic integration, but no difference from the standpoint of time-on-task. He found the most convincing evidence that intrinsic was better than extrinsic integration for less familiar (far) transfer tasks—where the nature of two independently performed task changes greatly—and not as a good for more familiar (near) transfer task—where the nature of the tasks are mostly the same.

[1] conceptualized learning in serious games from the perspective of acquiring domain expertise through knowledge acquisition and development. Building on the work of [3], the authors described three stages of skill acquisition from cognitive (novice) to associative—where learners chunk increasingly large conceptual units together—to autonomous (expert) stages. They created a framework leveraging these three stages, including model, interface, learning activities, and learner control features. Model features dealt with domain content. Interface features dealt with everything from graphical interfaces to learning resources and scaffolding. Learning activities features dealt with tasks players completed in games. And, learner control features dealt with the rate of flow and the complexity of the "chunk" of information presented in games. As players progress in games with increased knowledge, the complexity within this framework increases.

[13] developed and described a framework for hierarchical scenario-based approaches to designing serious games. Scenarios are tools used for understanding the use context of an interactive design—e.g., serious game. For serious games, that context is directed toward training. [13] took an activity-theoretic approach to develop a hierarchy of activity, action, and operation in the scenario. Learning in this approach occurred as shifts between actions (e.g., tasks in the game) and low-level operations (e.g., basic controller usage), actions and high level activities (e.g., overall game objectives), and between the real and game worlds. Integrating content using this framework involves organizing learning content around operations, actions, and activities.

[9] argued for utilizing problem-based learning as the basis for designing serious games. They argued that problem-based learning should be tied to serious game design because problems are the basis for many games and can be directly linked to specific domains. Further, they identified eleven different types of problems and linked game play structures most likely to support them.

One final article we found with regard to integrating serious content into games was from [11]. This article was a reflection on the design of a serious game to teach basic high-school/early university-level intravenous biological concepts. The design team was made up of a wide array of experts including game designers, instructional designers, science experts, and graphic artists. The authors noted several challenges they faced during the development of the game with respect to content integration. They stated the goal in content integration was to guide the learner through exploration. One of the big challenges though was to make sure the game model of the content matched sufficiently to

the real world models. There were certain tradeoffs in the representation of the game where the gameplay was more important for the training experience (e.g., the density of cells in the veins) over realism of the content. A second challenge was that any introductory text in the game would likely be skipped by players and any core content that "needed" to be learned had to be integrated within the rules of gameplay. Finally, a large portion of the game was secondary media to enable a player to complete sections of the game in a problem-based approach to instruction in the game. This represented yet another challenge about how to incorporate images, video, animations, and a live chat to ask questions during the game's pause screen.

2.1 Insights for the study

From this research, several key ideas can be built on for the study we are undertaking.

First, one important issue brought up in both [1; 7] was the idea of measurement of training outcomes. Both generated a framework/heuristic evaluation by which future games can be evaluated based on theories of instruction. We are interested in understanding how practitioners measure the effectiveness of their game designs. To what extent is it an important issue to them? Along these lines, we inquire into the understanding of what training outcomes and objectives participants of the study have for games they design.

[8; 10; 11; 19] all mentioned the importance of game features and representations used and the outcomes they have in various games. Certain ways of designing the game elements and mechanisms will enhance or detract the training experience. [8] in particular provided evidence that these decisions influenced motivation and transfer of knowledge. How do professionals utilize these resources and focus in on particular mechanisms and representations to use in the game? How are they applied?

[1; 13] both described progressive complexity as an important concept to design into serious games. As players become more skilled in the content, more challenging or complicated content needs to be available both to maintain motivation and flow in playing the game, but also in ensuring the novice in a topic can become an expert.

[8; 11; 19] all made reference to the outside world in which a game is played. Once played, a game must help players reintegrate this learned content with the outside world in which they live and work. [9; 11] analyzed problem-based approaches forcing students to go outside the game to access materials that can help them complete the game and understand important concepts. How do professionals use the serious games they design as one part of this larger training process? What other resources do they use in part with this game to support training?

Finally, [11] mentioned the diversity of experts used to design the game they worked on. Serious game design, like any modern software pursuit, is a complex creation requiring many vast specialized skills. What skills do professionals believe are necessary to contribute to a modern serious game design and development project?

3. PROPOSED METHODS

The above research has focused on applying theories in the field of instructional design to the process of designing serious games. While such an approach enriches the designers' ability to create effective training experiences through gameplay and assessments to measure that training through frameworks, models, and heuristics, they do not intrinsically describe the practice of integrating content into serious games.

For this study, we interviewed serious game designers to explore the process of embedding or integrating content into serious games. The interview was semi-structured with questions asked found in Table 1. Participants were asked to respond based on previous design experience as well as how they would hypothetically respond even if they had no experience with these issues.

Table 1. Questions to be asked in interview

Demographic/Background Questions	Integrating Content Questions
Would you be willing to identify your gender for us?	In what ways might game elements interfere with attaining training goals?
On a scale of 1 to 7, where 1 is completely disagree and 7 is completely agree, how do you feel about this statement: Games are a leisure activity. Games are a communicative activity.	In what ways might the training method interfere with making an enjoyable game?
	How can you determine what game genre to use to attain training goals?
For each game genre, please respond yes or no with regards to whether you have played video games of this genre or not. Action or Sports, Adventure, Shooter, Role-Playing, Simulation, Strategy, Exergames, Advergames, Puzzles, Card Games, Educational Games	How would a serious games professional integrate the training goals with game elements?
	What skill set and knowledge is required for designing and integrating engaging gameplay and instructional content?
What degrees have you earned?	How would you determine if a training game was successful?
What is your current job title and responsibilities?	

Have you had any formal training in serious games?	
In your professional history, have you ever participated in the design of a serious game? Please explain your role if you have.	

Each session took approximately 30 minutes to complete. The first several questions were demographic and psychographic in nature, asking about their backgrounds as well as their current working situation as it pertained to serious game design. The second set of questions looked for detailed perspectives, based on experience, on the problem of integrating serious game content into serious games.

Each session was led by one researcher, audio recorded, and transcribed. From this transcribed data, themes were then qualitatively coded using the analytical methods described in section 4.1.2. A form with the questions in Table 1 was used to record responses with room left for responses and follow-up questions asked by the researcher.

3.1 Participants

Participants were selected by reaching out to serious game designers using LinkedIn. We also supplemented this with a number of alumni from our program who have worked in the field of serious game design for a number of years. We recruited 7 male and 4 female participants. Participants were geographically diverse including 2 from California, 2 from Indiana, 1 from Michigan, 1 from Pennsylvania, and 5 from New York. The majority worked on serious game design, though a few had taken on other roles. All the participants had been involved with multiple serious game designs in the past. The backgrounds of participants included 3 game/media design, 5 instructional design, and 3 of mixed game design and instructional design backgrounds.

3.2 Analytical Methods

Starting with the insights we took from the literature review above, we analyzed the responses from participants according to the following framework.

- Communicating content

In their responses, participants described ideas that should be included in a game, whether this was a training objective, some information that should be conveyed, or an important idea for the serious side of the gameplay. They described either particular examples of concepts integrated into a serious game or general concepts that should be a part of any serious game. Where possible, what the concepts were and how they were integrated were investigated and recorded.

- Progression of content complexity and challenge

In a few cases, participants described the difficulty, challenge, complexity, or advanced state of challenges and tasks within a game. As players become more experienced, the nature of challenges and tasks may vary. When possible, what the tasks providing challenge for players were, how they became more difficult through gameplay, and how increased complexity tied to training were recorded.

- Goals, desired outcomes, or objectives of gameplay

Participants described the overall objectives of designing such a game—a desirable state by the designers for their players. This could be awareness of certain information, performance improvement, or changes in player behavior. When possible, what the desired outcomes were and how the designer accommodated them were recorded.

- Measures of effective communication

Participants described how they knew the communication they designed was effective. They described the means they used to measure that effectiveness or the success of various strategies. Where possible, the measures they used and how effective the measures were for evaluating the content of the serious game were recorded.

- Game features used

Participants described game features designed to deliver the content. These features included aspects such as the game story, the point system, playing mode (e.g., single-player, multiplayer, networked, and massively multiplayer), control schemas, and so forth. When possible, the type of feature participants used, how it was used as a part of the game, and how it delivered content were recorded.

- Representations used

Participants described representations they designed for the game, such as visual design, symbol systems, textual or auditory systems, and so forth. These representations included game perspective (e.g., first-person, third-person, isometric, disembodied, or abstract), genre, interface elements (e.g., HUD), and the representation of game features—for example, particular, iconographic versions of a treasure chest. When possible, the representations participants used, the role they served, and how they delivered or related to content were recorded.

- Supplemental research/knowledge

Participants mentioned sources of supplementary knowledge used for content in the game, to validate decisions made about the content of the game, or to support the design and development of the game. This included the use of subject matter experts, external sources (e.g., workbooks or training manuals related to a subject), primary research on the target audience, or secondary research about the target audience or subject matter. When possible, the supplementary knowledge participants used and the role it played in content creation for the game were recorded.

- Integration into a larger communication strategy

Participants occasionally mentioned a larger strategy of communication of which this game must function as a part. For example, in edugames, the game may be one of several instructional media developed to instruct on a particular concept. When possible, any additional media that supplemented the outcomes of the game and the relationship between these media or the larger organizational context were recorded.

New codes were added to account for meaningful patterns describing attributes about the process of integrating serious content into serious games that did not fit into one of the categories above. Such codes included looking a little more deeply at the skills involved of game designers, the broader organizational context in which such games are designed, and the overall process of design.

From this framework, a number of consistent themes, barriers, processes, and concepts were found. These patterns reveal some of the issues professionals deal with as they integrate content into serious games.

4. FINDINGS

4.1 Designing representations and mechanics

There are a number of challenges related to the representation and mechanics. The first of these is how to appropriately tie learning objectives into the game, the second is how to ensure the game world draws and keeps the user in the game, and finally there is the issue of designers' audiences being distracted from the learning objectives when playing.

With regard to tying learning objectives into the game, many participants had difficulty elucidating a standard procedure they used to integrate content. At least two participants explicitly stated that such a question is difficult to answer because each game design project is unique with its own set of circumstances. A number of participants did reveal at various points throughout the interviews a number of more general features serious game designers control to integrate content. First, participant 10 (P10) laid out a strategy whereby levels are designed to practice content learned and "boss" levels are used to reinforce and consolidate knowledge at a quicker pace. Such levels also offer good summarization opportunities of the content. While such a suggestion mimics the Keller's ARCS model used by [7], it was also rooted in game mechanics, which can be applied to design much more readily than the framework presented in their article. In line with this thinking, P1 also revealed how many games are most effective when providing repetition to increase exposure to core concepts and reinforce processes that must be learned. For the repetition to be effective, the game mechanics and structure must remain simple—this sentiment was also echoed by P8. P1, P5, and P6 pointed out how the granularity of content impacts design decisions. Certain subtle points can be difficult to represent effectively through game mechanics and decisions presented to game players.

P1 and P10 both urged that higher levels of abstraction of concepts can be more effective for deeper learning (e.g., the example P1 used was for teaching about counting, instead of using numbers, use counting sheep as someone is starting to fall asleep). This mimics the discussion of endogenous versus exogenous games described in [19]. Finally, P5 pointed out how not only game pace must be considered, but the pace and balance of the content as it is introduced is also a crucial component to successfully tying learning objectives into game mechanics. Hence, they needed to adapt how and when content was introduced to the cognitive capacities of the audience at each phase of the game.

So, these challenges for tying in learning objectives include:

- "Boss" levels to reinforce/consolidate content
- Repetition of key concepts/core processes
- Identify granularity of content to be dealt with in game mechanics

- Use level of abstraction to modify relationship between content and game mechanics
- Breakdown content to a suitable pace for your audience

A number of participants mentioned the importance of building an engaging world for players to enter into as they complete learning objectives. P9 mentioned how the game world and all that makes it up and makes it seem believable—content, story, aesthetics, character development, world design—are vital to learner engagement and buy-in for the game. Game genre was one such attempt to leverage the sorts of games learners are already familiar with and use them to transform the world into something familiar and comprehensible. As P5 pointed out sometimes defining the genre of a game is obvious, other times factors must be balanced in arriving at a suitable game genre, such as:

- Training goals, e.g., what to punish and what to reward (as mentioned by P4, P8, P12)
- Technical platform in use (as mentioned by P5)
- Real life context (as mentioned by P5 and P7)

In relation to this representation and game world created by designers for learners, designers must also understand their own role as disruptive agents. The particular issue described by P8 and P12 was the issue of evaluating learning. Once designers have created an immersive world in which players learn, forcing those players out of the system to evaluate that learning can often do more harm than good. Feedback and evaluation must occur as intrinsically tied with the game narrative/world. Visual design and narrative construction as well as other "ephemera" was ignored or at least not discussed at length in the literature, even though it plays an important role in engaging learners with the content to be learned.

The final main issue participants pointed out was the role distractors played in serious game design. Game design can be so effective because it often can be played in a number of different ways depending on the motivations of the player. Serious game designs had the goal of participant learning, often within a set time frame. Aspects distracting from this goal can make serious games less favorable than an instructional video in these cases, particularly when looking at the cost to develop the serious game. P6 and P9 pointed out that one of the biggest issues facing serious game designers was players "gaming" their games. In this situation, players sought out alternative objectives about the game, such as getting the highest score, as opposed to learning the content underlying the game. Proper balance of game elements and learning objectives was required to hope to stave off "gaming" behaviors.

4.2 Balancing Engagement and Learning Objectives

Nearly all participants mentioned seeking a "balance" between the fun parts of the game and the educational parts of the game. This balance had an ineffable quality to it, though they all tried to describe it in their own ways. P1 stated serious games only work when they feel like games and not learning. P6 mentioned predictability as the fulcrum balancing the two—games are fun because of chance and unpredictability, but training is inexorably predictable. In scrutinizing this data even further, we realized there were three levels of balance being described: balance of promotion/incentives, balance of engagement and learning objectives in design time, and balance of engagement and learning objectives in training time.

In balancing promotions and incentives, we uncovered what we might call a balance in content. This balance involved asking

whether each element included in a game design served a learning goal. At that point, depending on the rigidity of the client and the other factors of balance described below, a game designer may decide to keep that feature. As P10 pointed out, games are inherently representations, such that they promote some meanings at the expense of other meanings. The negotiation of which meanings are present happened between client and designer.

Balancing design time was a question of where the designers are investing their own resources. Some of the techniques described in section 5.1 are time intensive activities designers must engage with and test. Particularly, trying to abstract the essential structure of learning content and find a unique mapping between game mechanics can monopolize designers' resources. Although this sort of exploration was part of the design process, there was a point at which designers needed to find a way to accomplish the learning objective of the game, even if that meant using the content directly in the game.

Finally, depending on the learning context, training time was an important factor to account for in the design of the game. Modern commercial games can take 20 or more hours to complete, but training often required a much more rapid approach for players to accomplish the objectives and learn the content. P6 mentioned he often faced situations where he had an elegant and engaging way to create the game world, but the approach was infeasible for the client because they had a finite amount of time to devote to the game for training. Certain other educational games to be learned in the classroom must be playable within short hour-long timespans or less. As P1 pointed out above, quick snapshots of gameplay, simple mechanics, and repetition were often the most effective in these cases.

Balance in games was a nuanced idea because of the three ways balance occurred in serious game design:

- Balance in promotions and incentives (content)
- Balance in design time
- Balance in training time (play context)

4.3 Realism and Authenticity
Realism is often a topic brought up in the context of game design. It frequently referred to photorealism of visual graphics. Within serious game design though, realism is brought up with respect to aspects of game design: realism and authenticity of the decision making and relationship of game world to real-world context. The crucial factor separating entertainment-based games and serious games was that what happens inside the context of the game should have meaning beyond the magic circle.

From the standpoint of realism in decision making, designers, such as P6, struggled with making game decisions important and interesting as opposed to trivial and obvious. Designers wished to give players an open realm to explore, but when there were distinct learning objectives accompanying a game, there were often right answers and optimal ways of making decisions, which must be designed for. However, these decisions were often not all that interesting for players to make. P6 mentioned a game where he wanted players to struggle with the decision to take a right or wrong action, but the client did not want to be seen as promoting wrong behavior and so the decision had to be guided more forcefully in the end.

P9 brought up the second interesting issue with regard to realism. For certain content areas, such as physical systems, misrepresenting the content system would be damaging to the learner. In P9's case, a subject matter expert was not pleased with the abstraction the game was using to represent the physical

relationships of objects in relation to each other. Since every game is a representation it is impossible to completely and faithfully represent all aspects of the real-world context. In fact, games can often call attention to very subtle aspects of the real world designers want players to pay attention to. This struggle was also described in the serious game created by [11]. Game designers though, should be sensitive to the relationship the game has with the real world concepts they represent.

4.4 Evaluation
Evaluation is an important aspect of the design of any educational intervention. The participants recognized the importance of evaluating the success of the game, but they often had much more broad appreciation of evaluation than we anticipated coming into the study. There were three categories of evaluation mentioned by participants: evaluation of learning, evaluation of engagement, and organizational factors involved in evaluation.

The methods mentioned for evaluating learning most frequently involved a pre-test/post-test structure (P9, P10, and P11). This method was the most popular since it clearly demonstrated a learning gain due to the serious game and was also relatively easy to implement. This form was effective only for capturing short-term learning improvements. Long-term improvements were also desirable, but much less frequently captured because they are more expensive and difficult to organize. P2 and P8 mentioned evaluating recall over longitudinal timeframes with the game, although it seemed that both were speaking hypothetically about evaluation at the time. Even more difficult to capture, P2 and P3 hypothesized about transfer of knowledge from the serious game into other non-game contexts. Finally, P10 proposed tracking behavior and conversational changes for a game he had developed, though again in practice he had not yet used this approach. P6 complicated the issue of evaluating learning by stating most clients do not want to see the results nor, likely, spend resources to verify such learning as efficacious. He did mention though, that it was wise for any designer to be able to do such evaluation or outsource such evaluation when called upon. So, even though, getting at the level of evaluation described by [8] could make serious games more desirable, it seemed impractical to go to those lengths to evaluate most serious games by practitioners.

Something treated with as much importance as learning evaluation was player engagement. Often times, this involved play testing a game and verifying the game was maintaining player attention, learning content was not disrupting the play experience, the game was not overwhelming for players, and the game was, in general, fun to play. Other factors involved in evaluating player engagement included looking at play data once it has been released. As P11 posited: are people playing the game? how often are they playing? how long do they play for? From these questions, participants inferred how engaging the game was.

The final set of evaluative metrics emerged unforeseen from the study, though they now seem obvious. These involved factors outside of the game design, but were influenced by it. The first that participants mentioned was stakeholder buy-in and excitement. P5 and P6 mentioned this was always an important part of the responsibility of the designer to ensure clients and other stakeholders were excited about the game. Another factor—mention by P9—involved licensing of copyright protected content. While this influenced the game design, it involved factors well beyond the designers and were often crucial, in some circumstances, to player engagement in the game. Finally, cost/benefit and return on investment (ROI) were important to

convince clients and stakeholders to invest in a game and P8 claimed the game must offer a greater ROI than other media can due to the increased expense to produce them.

4.5 Exogenous Factors

There are a number of factors outside of game design, which will influence the effectiveness and success of the game. Although the list is numerous, the participants did touch on a number of influences and issues they dealt with in their design, some of which has been touched upon already. Specifically, these factors included the client, the threat of commercial games, and distinguishing the players from the person buying the game.

For designers, the client sponsoring a project must be made happy with respect to the game being designed. As mentioned in evaluation, clients often had a number of motivations influencing their desire to pursue a serious game design. The client may be concerned with learning, but they also may have other motives such as sales or retention driving their decision making. In many cases, as P11 points, this led to the client making design decisions the designer disagreed with, but must agree to—as was the case of P6 described above.

P5 and P7 mentioned the threat of commercial games on serious game design. Many players are acculturated by successful commercial video games with million dollar budgets and a great deal of promotional marketing. These games shape players expectations about all games, even ones with purposes aside from entertainment. Participants were keenly aware of these expectations, yet focused on what they knew they could do effectively.

Finally, P9 mentioned an important factor that influenced design decision. When designing educational games, particularly games for younger age groups, parents—not the child—were the ones making purchasing decisions about a game. Likewise, in training scenarios, organizations bought the games for their employees. In both cases, the design had to engage, but also had to serve purposes supported by the parents and employers respectively as well as game players.

4.6 Skillsets of Serious Game Designers

We inquired into what these designers, despite being from very different backgrounds, believed were requisite skills for doing serious game design. The most common required skill was extensive game knowledge (P1, P8, P10). Other important factors include knowing what people like/think was fun (P5, P6, P10), an understanding of the audience (P1, P8, P9), pedagogy or instructional design (P5, P7, P9), and game design—particularly learning game design (P1, P6, P9). While every designer has his own list of what is needed to do the job of a serious game designer, there is a clear focus on a need to understand games and understand your audience and only then to understand learning principles that can be useful in design.

5. IMPLICATIONS

The contributions of this paper are to the practice of serious game design. We focused on the process of integrating serious content into serious games. Beyond understanding the literature surrounding the topic of content integration, we approached this inquiry by first learning how the process of integration happens for serious game designers in the field. What problems do they face? What techniques and processes do they use? What models do they have for explaining the content and how is it to be understood by players? What expectations do they have about how a serious game will effectively lead to learning? We found that while there is some overlap with the literature in design practice, as commented on above, designers deal with many other aspects including player engagement, game promotion, and other organizational issues not yet addressed in serious game theory.

We also are hopeful this study of professional practice will further the conceptual models developed in [1; 7; 10; 19]. We found these previous studies acknowledge the importance of measurement, game features and representations used, progression in game challenge and complexity, situating the game in the real world and among other training media, and having a variety of skill sets to draw on in serious game design.

There is a role for such theory, and serious game designers are open to using models and techniques developed by researchers in the field when they can be integrated easily into the design process. These prior studies have focused on bringing instructional design theory to game design. Consequently, research on serious game design needs to incorporate more models for applying theory as well as additional case studies of application of such theory, such as in [11]. Finally, there also needs to be a larger role for understanding the role game design plays and what it brings to instructional design in serious games.

In this paper, we presented data and insights from interviews with professionals. This data showed the delicate balance game designers must deal with including the game mechanics, representations, and learning objectives. We uncovered a number of strategies game designers use to integrate content into games including using "boss" levels to reinforce learning, using repetition of content, identifying the granularity of content to be integrated into the game, using abstraction, and pacing content based on the audience. We also uncovered a number of issues including users "gaming" serious games, the nature of realism in serious game design, evaluation that usually involves testing for short term learning and player engagement, and the threat of commercial games.

It is hoped future studies on serious game design will link the practice of designing serous games with the pedagogy of serous game design. We believe the lessons from this paper could help instruct students to understand instructional and game design perspectives equally, user-centered design, and the role game designers play in promoting their own games to stakeholders in their own organizations and other audiences. We anticipate these studies will be useful for helping to revise our own course in serious game design in the spring of 2014.

Understanding this process of serious content integration will hopefully convince academics to take serious game design more seriously and to promote the value of games in instructional situations.

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