The Role of Narrative in the Design of an Educational Game

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Abstract: Storytelling is an important, engaging social practice. While video game designers are storytellers of the information age, educational video games fall short of using narrative effectively in practice. To better understand useful narrative approaches, this study explored how designers perceived and used narrative during the creation of an educational video game. A qualitative, ethnographic, single case study approach was used to collect and analyze data pertaining to the narrative design trajectory of the game design team as well as Citizen Science, the game artifact they produced. Findings include typologies comprised of fourteen key types of narrative perceptions and uses that surfaced in this case study. Implications include the notable use of narrative as a reward mechanism, and as a design team anchor.

Introduction to the problem

Video games with narrative stand to addresses critical educational needs. The Partnership for 21st Century Skills Learners posits that students need to be engaged with learning as they: "analyze and evaluate major alternative points of view" and "reflect critically on learning experiences and processes" (Trilling & Fadel, 2009, p. 52). There is a strong conviction that narrative can be designed to promote learning benefits through educational video games (Waraich, 2004). However, educational game designers fall short of using narrative effectively in practice. Although commercial video games lead the way in popular narrative game design, educational games stand as a unique genre that can make contributions that the commercial industry cannot (Squire, 2003). Educational game designers are positioned to innovate techniques that leverage game features uniquely to promote learning objectives. This constraint of meeting learning objectives puts designers into a unique situation where they are able to view and use features like narrative with innovation, experimentation, and distinction.

Narrative is an emotionally engaging feature of games as well as a primary mode of thought. Enhancing the quality of narratives of educational games for learning benefits is a compelling area of inquiry. To better promote the quality of narratives in and around educational games, it is important to investigate how designers utilize narrative during the process of production. The purpose of this study was to explore how designers *used* and *perceived* narrative during the process of designing an educational game, in order to identify and describe issues that can promote engagement for learning.

Literature Review

There are various narrative theories that exhibit relevance towards narrative design for educational games. Several narrative theories demonstrate views of narrative as it is expressed through types of media. It is also relevant to point out that the ideas presented here mainly pertain to *narrative as a research topic*, as opposed to *narrative research*, a methodology in which narrative provides the means of conducting research. This study distinguishes narrative using Äyrämö & Koskimaa's (2010) three theoretical groupings of the concept. The first group, *traditional theories*, covers theories ranging from literature research to the beginning of French structuralistic narrative theory. The second group, often labeled narratology, is the *classical theory* category. Main ideas within this category include viewing narrative as a language, where a system of signs represent and contain certain meanings, such as signifier and signified, respectively (De Saussure, 1983). Thirdly, the *new theories* group has jettisoned the notion that narrative must be dependent on a medium for it's existence, and embraces a more phenomenological approach. This study's focus on narrative and knowledge aligns with this *new theories* group.

Cognitive psychology puts forth the idea that experience is mentally narrativized. We use our narrative-based mental models to predict future events. When those events violate our expectations, the result is meaningful learning and engagement. Jerome Bruner's work extensively examines narrative as a scheme for making sense of experience. One of his primary and popular arguments is that there are two modes of thought: the paradigmatic and the narrative. The paradigmatic, or "logo-scientific," way of thinking produces well-formed arguments, whereas the narrative way of thinking produces well-formed stories (Bruner, 1986). In alignment with Bruner, Schank & Abelson (1995) argue that virtually all knowledge is based on stories constructed around past experiences.

Much of the literature on narrative and knowledge places value on *surprise*, or *expectation violations* of some kind, where individuals' predictions about what might happen in a given situation is undermined or changed by some-

thing unanticipated. This unpredictable change causes one to re-evaluate beliefs and assumptions previously held about the given context.

Within the literature on narrative and knowledge places value on surprise, or expectation violations of some kind, where individuals' predictions about what might happen in a given situation is undermined or changed by something unanticipated. This unpredictable change causes one to re-evaluate beliefs and assumptions previously held about the given context. According to Bruner and Schank, an important feature of narrative is surprise. The elements spoken of are strikingly similar to narrative design language for game creation. Players are assigned roles, goals, and obstacles as fundamental characteristics of many games. Expectation violation is a useful concept derived from cognitive psychology that is relevant to narrative design for educational games. While the question of how to leverage the benefits of narrative characteristics like these within educational games has been approached before (Äyrämö & Koskimaa, 2010; Dickey, 2006; Swan, 2008), the question of how educational game designers use narrative in practice has had relatively little attention.

Research Questions

The general narrative areas of character transformation, dramatic arc/interest curve, genre/surprise, and obstacle were selected to form a conceptual framework that guided this study during the pursuit of answering these questions:

1. *In what ways do designers use narrative during the process of making an educational game?*
2. *In what ways do designers perceive narrative as an attribute of educational games*?

Methodology

A single case study approach was selected to collect, analyze, and report the data. In order to understand narrative design for educational games, one software project undertaken by one professional design team was studied. A single case study was ideally suited for this specific study because of the highly contextualized and dynamic nature of software design collaborations and processes. This case was also selected because of the compelling narrative issues involved in the project, precipitated by choosing a narrative-based game genre (adventure games).

A single case study approach allowed the designers' specific practices to be explored within their specific contexts (Stake, 1995). The collection of numerous sources of data added depth to the research (Cresswell, 2007): interviews, observational field notes, design documents, and game artifact iterations. Analysis was done using triangulation methods to enhance validity (accuracy). Triangulation methods included the comparison of similar meanings derived from differing circumstances and data sources, such as design meetings, participant interviews, and playing the game artifact. Colleague researchers at a Midwest University also participated in reviewing segments of the collected data and providing interpretations that reinforced and called into question my interpretations. These reviews took place on campus at the Midwest University. Participants were also asked to member check, or review drafts of the researcher's written reports for accuracy and tone (Lincoln & Guba, 1985).

Findings

This study aimed to discover how designers use and perceive narrative during the process of creating an educational video game. This section gives an overview of the *Citizen Science* project, followed by a typology of designer uses, and a typology of designer perceptions. Between 2008 and 2012, a uniquely composed group of scholars and commercial designers began collaborating in a Midwest, U.S. city to produce a new kind of educational video game. The team spent four years carrying out design cycles in a process of iterative design to meet these goals. Challenges included temporal and budgetary constraints, as well as the merging of team members from the corporate and academic sectors. Two goals in particular drove the team's game design efforts: 1) centering the game upon identified learning goals, and 2) to make a game as fun as popular commercial video games.

As a narrative design process, the team's work followed a certain sequence of design focus. Attempting to encapsulate and represent the complex, cyclical nature of this design process is not an exact, comprehensive, or accurate endeavor. Nonetheless, by considering the projects' design process from a narrative point of view can shed light on one thread of progression through the design process (see Figure 1).

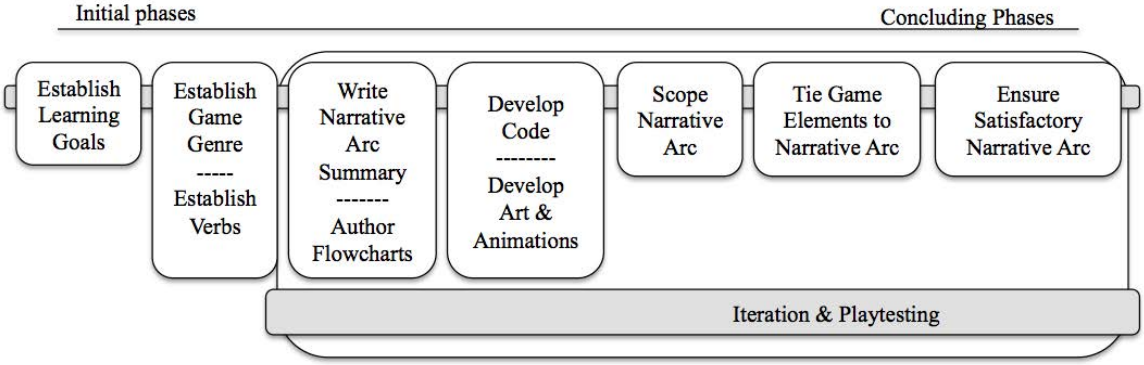

Figure 1: Narrative design process of Citizen Science

Citizen Science Game Summary

It is important to provide a summary of the *Citizen Science* game. This summary provides context for the reader, so as to understand what the player does during gameplay. Further, this summary is an example of one type of narrative perceived by team members. Frequently, team members would refer to an overarching narrative, in reference to the main plotline, or sequence of events that took place in the game. This summary is adapted upon participant Mike Boone's "extended summary" of the *Citizen Science* game:

> In this game, the player is a citizen-scientist who is tasked with the quest of helping to save a sick and potentially dying lake spirit – the fantastical representation of the once and future lake. The player explores the shores of Madison's Lake Mendota, first arguing with his/her father about letting their dog swim in the lake. The Lake Spirit proceeds to send the player back in time, to save the lake. Assisted by a friendly muskrat, and using a Lake Globe model, the player assists a limnologist, argues with protestors, and collects secchi disk readings.
>
> The player returns to the present, and is visited by the player's future self, who warns the lake is still not safe. With guidance from the limnologist, the player persuades farmers and fishermen to alter their behavior, and collects chemical readings that indicate lake runoff from farms. The player argues with some homeowners, convincing them to use proper fertilizer and plant rain gardens in their back yards, as it could help filter runoff into the lake.
>
> The player discovers that the once-friendly muskrat has turned antagonistic, persuading citizens to ruin the lake to benefit muskrat populations. The player convinces the muskrat to stop, in part by traveling to the Capital, to persuade a state representative to preserve local wetlands. Finally, the player saves the lake/lake spirit, but is visited by his/her future self, who invites the player to travel to the future, where more can be done to preserve the lake's health.

Uses & Perceptions

This study aimed to discover how designers use and perceive narrative during the process of creating an educational video game. While collecting data for this study, a central issue arose: designer uses and perceptions are frequently connected, influencing one another with reciprocity (see Figure 20). A designer making decisions would be making those decisions based on personal perceptions, and vice versa; ones' experience creating elements of a game would shape personal perceptions (see Alex Games' related notion of dialogues in Games, 2008). This reciprocity between categories challenged my decision to create categorical distinctions based on the research questions. Nonetheless, separating the two issues proved helpful for analysis, discussion and readability. I placed issues that were clearly demonstrated by Citizen Science designers, and that could be clearly implemented by future designers in the uses category. These are issues related to observable decisions made within design meetings or actions occurring through individual design work resulting in clear examples in the Citizen Science artifact. In contrast, I placed issues that were highly saturated with conceptual, abstract characteristics in the perceptions category. These are issues relating more to designer opinion, definitions, or grand debates than to demonstrable designer actions.

Figure 2: The reciprocal influence of narrative uses and perceptions.

Designer uses and perceptions of narrative

This study's first research question asked: in what ways did designers use narrative during the process of making an educational game? Seven issues were chosen because they relate to designer uses of narrative while creating *Citizen Science*. The issues pertain to observable behaviors made within design meetings or individual design work that is exemplified within the *Citizen Science* artifact. This study's second research question asked: in what ways did designers perceive narrative as an attribute of educational games? Seven issues were chosen based on data themes that were highly saturated with conceptual characteristics, designer opinions, and designer perspectives.

Designers used narrative to…	Designers perceived that narrative…
1. Establish a tripartite foundation 2. Approach work differently and similarly 3. Teach systemic relationships 4. Dialogue about design 5. Share a ludic affordance 6. Engage players through character transformations 7. Scaffold content and gameplay	1. Provided a flexible tool 2. Enabled good games 3. Emerged through gameplay 4. Promoted engaging gameplay 5. Encouraged positive identities 6. Engaged through fantasy 7. Provided a mechanism for reward

Table 1: Designer uses and perceptions of narrative

Discussion

This study presumes that by better understanding narrative design issues, future educational game design teams could refine and adopt effective narrative literacies, practices and processes that would enable engaging learning experiences through student gameplay and reflection. Designers could communicate with one another using deliberate narrative-related language in reference to the numerous types of narrative elements of games. Designers

could be armed with narrative-related techniques and affordances specifically relevant to the *educational games* genre that would be usefully applied in design meetings and game production. Also, the team members specifically tasked with producing the narrative arc (e.g. the developer and writer) would be better positioned to embed narrative features that integrate engaging and pedagogical characteristics.

At the outset of this study, the general areas of character transformation, dramatic arc/interest curve, genre/surprise, and obstacle were selected to form a conceptual framework that guided this study during the pursuit of answering these questions:

In what ways do designers use narrative during the process of making an educational game?

1. *In what ways do designers perceive narrative as an attribute of educational games?*

While I discovered a variety of topics and issues during my data collection activities, this study's initial conceptual framework and research questions kept me grounded and aware of critical narrative issues as they surfaced. During this study's data analysis phase, several themes emerged, including the issue of fantasy as an engagement catalyst, the impact of genre design, the character turn as a prominent design technique, the prominence of the dramatic arc, and the challenge of leveraging emergent narrative.

I found several sophisticated instances of narrative use and perception among the designers of *Citizen Science*. Designers embedded narrative elements first and foremost in support of learning goals and in alignment with the selected game genre. They made decisions about setting, characters, and events to make the game as *good* as possible. Predominantly, designers perceived narrative as a *tool* used to impact the emotional engagement of players.

The implications of this study are based on a single case study. As Stake (1995) suggests, single case studies justify descriptive, rather than generalizable, findings. As such I convey implications by describing significant themes of this study – not to generalize but to indicate compelling issues that, when compared with future similar studies, have potential to become generalizable.

This study demonstrates the multifaceted nature of narrative. From the many narrative trends found in this study, two implications are highlighted: perceiving narrative as reward and the need for regularly reviewing narrative among a design team.

Narrative As Reward

Because designers perceive narrative as providing a mechanism for reward, we must reward players with natural narrative moments that generate uncertainty about content issues. The *Citizen Science* team valued narrative as long as it was naturally integrated with the game, and gave a sense of reward that would engage players towards sustained play. *Citizen Science* designers felt that "bad" narrative existed in games due to "slapping" it on without basing it's design on game themes, or using narrative events as mere transition pieces between game levels. In contrast, they felt "good" or natural narrative held attributes like being tied to learning goals and game mechanics, or engaging players to the point that they want to move the game forward with a sense of purpose and motivation.

As Frome and Smuts (2004) suggest, suspense is especially rewarding and impactful to the player during key moments of helplessness. These moments encourage reflection and consideration of fears or hopes about uncertain outcomes. For *Citizen Science*, there does not appear to be events that engage players emotionally to the extent described by Frome and Smuts, or desired by the designers. It seems fair to say a number of factors influenced this limited implementation: budget, time, prioritization of other design tasks. However, an aspect of the game that shows potential for instantiating such rewarding narrative instances are in the photograph macguffins (an object that drives a plot), where the avatar in the present and future are shown. These "Back to the Future" moments involved brightly colored photographs being displayed onscreen after a non-player character gave it to the avatar. The photographs served as a kind of lake quality window, allowing the player see a progress indicator as their arguments changed the quality of the lake over time. The lake would appear cleaner in the photograph as the player successfully argued with others.

These photograph-narrative events were connected to the learning goals because they conveyed the lake's quality to the player. The photographs also implied future, uncertain events to come – the futuristic picture shows a world that is unknown (the future), and as a non-player character states, the lake there is in more peril, which raises a question of what the problem might be, since the lake appears clean (non-eutrophic) in the photograph. These

photograph moments show potential as rewarding narrative events because they propelled gameplay forward toward learning goal issues.

As I progressed through this research project, the issue of encouraging engagement and reward mechanisms often brought up potential criticisms or ethical debates around these ideas. A common theme of my discussions with participants was how narrative worked well in helping get players to want to keep playing. Narrative sometimes took on the image of emotional hits that designers doled out to keep players hooked on an experience. I reconcile these kinds of ideas with notions of balanced approaches to life being necessary and encouraged. I also felt that the incorporation of learning goals into the experience ennobled the efforts by designers to encourage sustained gameplay. In a culture that reveres the notion of lifelong learning, encouraging engaged curiosity is a worthwhile practice to encourage. Considering these criticisms brought me to the conviction that designers should make efforts to explore designing rewarding narrative moments that are imbued with uncertain content-related issues. The association between narrative-induced emotion and suspense around learning objectives is compelling.

Designers can ask themselves questions about narrative rewards to assist in the design process. Asking these questions can make a narrative event transform from a mere transition piece to a rewarding moment of reflection and suspense generation. Questions to ask include:

- *Does my game include narrative moments where the player is rendered temporarily helpless?*
- *Will these narrative moments make the player uncertain about a content-related issue?*
- *How can you encourage the player feel especially fearful or hopeful about their uncertainty at this point?*

Narrative as Design Team Anchor

Because designers use narrative to dialogue about design, we must encourage designers to regularly revise and review overarching narrative documents. *Citizen Science* designers engaged in design discussions that consistently depended on the established narrative for guidance. This deceivingly simple document has significant impact on a design team's ability to sustain a united vision and effectively make progress. The overarching narrative summary was one of the resources that was changed and rewritten often for the *Citizen Science* project. This is an obvious reason to continually share this document with the team – so that everyone is aware of changes.

The review of the overarching narrative summary should be a routine part of the agile software development cycle that many game design initiatives follow. The team should be in the habit of reviewing the summary, minimally, at the beginning of the iterative cycle. Because team members utilize narrative so often, the summary should be one of the items first considered for revision. If revising is needed, when it is done, the document should be made available to team members, to help them re-establish the perspective of the project.

Because this was a single case study, the findings can be generalized only if multiple case studies are replicated. Where educational video games are being created, a similar case study could be carried out by an outsider researcher or an insider – a designer on the team or member of the organization. With multiple case studies performed, methods of good practice around educational narrative game design could be identified.

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