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Voithofer, R.J. (1999, April). Teaching computers to tell stories: Framing the design and research of learning environments through narrative theory. Presented at the American Educational Research Association (AERA) National Conference, Montreal, Canada.

We are seeing the restructuring of information and image spaces and the production of a new communications geography, characterized by global networks and an international space of information flows; by an increasing crisis of the national sphere; and by new forms of regional and local activity. Our senses of space and place are all being significantly reconfigured.

- David Morley and Robin Banks, Spaces of identity: global media, electronic landscapes and cultural boundaries

### Introduction

In the above quote, Morley and Banks address the growing impact of global networks and communication technologies on personal, local, and national cultural identities. They begin to articulate how these identities are in a state of flux and reconfiguration as global media sources compete with the increasing demands for locally produced culture and affiliation. Their thesis, if true, presents tangible implications for those researching, creating, and evaluating electronic learning environments; especially environments that will be delivered from a distance over electronic networks. This paper will link the issues raised by Morley and Banks to the design, construction, and assessment of electronic learning environments by addressing what can be gained analytically by considering narrative theory, derived from literary criticism and media studies, as a design and evaluation framework for electronic learning environments.

Narrative theory allows those designing and researching educational learning environments to theorize two of the most complex aspects of any mediated environment, time and space. Time and space exist in virtual dimensions (both expanded and compressed) in computer-mediated environments compared to their more linear constructions in face-to-face communication. When one considers an electronic learning environment that can be accessed over local and global networks, the individual student or group of students within a classroom becomes engaged in cultural tensions between local (i.e. real world, real time) and electronic (i.e. any world, any time) conceptions of time and space (Peters, 1997). Certainly some students can accommodate this tension with greater facility than others, nevertheless, those creating and studying learning environments have not adequately theorized the implications of this tension.

This study will base its claims on a textual analysis of the world wide web (<http://mayaquest.classroom.com/>) and CD-ROM game version of MayaQuest, a yearly (1995-1998) educational experience, in which a team of "explorers" on bicycles travel to Maya ruins in Mexico and Central America and communicate daily via laptop computers with satellite uplinks to (English speaking) students from around the world through the Internet. Collaboratively, the students and explorers, along with a team of experts (e.g. an archeologist and a historian) endeavor to uncover the collapse of the ancient Maya civilization based upon archeological evidence that the explorers find, photograph, and upload to the students. Since its inception, over 1 million children, teachers and others have participated in MayaQuest by way of the Internet.

The CD-ROM, on the other hand, attempts to capture the MayaQuest experience so that students can engage with this learning environment during times other than the two weeks that the team is in Central America each year. The CD-ROM tries to achieve the dramatic structure, interactivity, and motivational elements of the real time, Internet experience through two adventure style games where students try to engage in the same fact finding and problem solving activities. The CD-ROM is one of the most popular (based on sales) social science CD-ROMs in middle and secondary schools. A comparison of the two forms of MayaQuest will provide a set of contexts for narrative analysis that will be inclusive of two common delivery vehicles for electronic learning environments; local (CD-ROM) and networked (World Wide Web). This comparison will provide researchers and designers with a clearer sense of the flexibility that narrative theory can provide them.

This textual analysis will investigate what role narrative structure plays in the pedagogies of the MayaQuest learning environments, especially how narrative is used to open up and/or close down multiple conceptual spaces. "Conceptual spaces" within this context are characterized as symbolic, metaphorical, and pedagogical aspects of a learning environment that address a variety of cultural models within the intended audience.

A significant characteristic of a pedagogy that seeks to open multiple conceptual spaces is a movement away from simplistic binaries within such a pedagogy. This quality can also be attributed to postmodern critiques of modernist notions of knowledge (Marshall, 1992). In contrast, more prescriptive conceptual spaces, on the other hand, are fraught with binaries (e.g. right / wrong, win / loose, male / female, occident / orient, etc.). In struggling with her sliding positions as a participant researcher, Kondo (1990) makes an important observation about the need to break binaries in knowledge construction. She writes, "Deconstructing the binary between personal/ private/ experiential/ interior on the one hand, and political/ institutional/ theoretical/ exterior-to-the-self, on the other, is a key motif in the critique of individualism and self society, subject/world distinction."

The work of Gregory Ulmer (1989) is helpful in describing another component in what is meant by multiple conceptual spaces and begins to display more of the benefits of seeing narrative epistemologies in new media pedagogy. According to Ulmer people reason and classify as much by means of images and narrative as by logic and argument (i.e. prescriptive conceptual spaces). In explaining his notion of "conductive reasoning" he writes that "aesthetic and narrative forms associated with collage and conductive reasoning would explore dream-like logic, displacement, representational devices of collage, citation or appropriation, juxtaposition, fragmentation." Conductive reasoning is not the kind of cognition promoted by a traditional form of instructional design. This form in Ulmer's

language, "...promotes the dominant analytical-referential style of thought, which sets itself apart from and opposes all other styles of cognition, taking them at best as objects of study" "The desire to know, the love of learning, in any case is experienced emotionally, carried not in arguments but in images and stories, at the level of memory." He argues for pedagogies not constrained by the "poetics of realism"; that no longer strive for complete coverage.

It is important to consider the conceptual spaces that will be produced by the "new communications geography" that Morley and Banks refer to in the introductory quote. The study will use the notion of cultural models developed by Gee (1996) and Strauss and Quinn (1997). Cultural models have evolved as a way of studying mental models in a social context. Strauss and Quinn's approach tries to integrate a cognitive approach to understanding knowledge formation by showing how individuals negotiate information based upon internal schemas that are influenced by social and cultural contexts. Gee (1996) calls cultural models, "pictures of simplified worlds in which prototypical events unfold". Cultural models form the basis of choices and guesses about meaning within particular communities and always include a conception of what is acceptable and unacceptable to do within that cultural model. "It's not just *what* you say, or even just how you say it, it's always who you are and what you're doing when you say it." By considering how the narrative structure of the MayaQuest learning environments provide access to certain cultural models and conceptual spaces, the study will highlight how narrative theory can be used as an analytical tool, as well as a design tool.

### Narrative Theories

Clearly narratives are important to us; they furnish us with both a method for learning about the world and a way to tell others what we have learned.

- A. A Berger, *After Virtue: A study in moral theory*

I can only answer the question 'What am I to do if I can answer the prior question 'Of what story or stories do I find myself a part?'

A. MacIntyre, *Narratives in popular culture, media, and everyday life*

Narrative is thus an essential means by which human experience is represented and interpreted, whether it is as mundane as a trip to the grocery store or as momentous as a moral crisis that changes one's life forever. -narratives play a central role in the culture in which an individual lives, that is, they function as "tools" to mediate human action, and thus to shape and organize human experience.

- M.B. Tappan, *Narrative, authorship, and the development of moral authority*

The quotes by Berger, MacIntyre and Tappan suggest the variety of everyday contexts in which narratives provide meaning. Narrative theories, as articulated by literary theorists (O'Neill, 1994; Richter, 1996) and adapted by media scholars (Fiske, 1987; Bordwell, 1997), provide numerous parallels to the learning processes that occur when an individual acquires new knowledge and synthesizes it with existing knowledge. For example, narrative theories can describe and theorize learning processes including anticipation of events and information, addressing prior knowledge, showing the results of a change in knowledge, creating desire, etc. Put simply, narrative theories offer a language to describe the variety of manners that information and knowledge can be structured for a student and by the student. Narrative theories offer fruitful unifying frameworks with which to examine the structure of electronic learning environments. The benefits of narrative theories are particularly evident in areas that are under-theorized in traditional learning theory, including the complex ways that narrative attends to issues of time, space, memory and pleasure.

Narrative works by structuring time as a sense-making mechanism that shapes particular aspects of the reader's (learner's) expectations by creating suspense, surprise, and curiosity (Fiske, 1987). In other words narratives ask the individual to fill in meaning spaces and make inferences. Narrative cues memory by recalling previous events. Bordwell and Thompson (1998) call narrative, "a chain of events in cause-effect relationship occurring in time and space." Similarly, Bal (1985) uses the term *Fabula to*, "describe a series of logically and chronologically related events that are caused or experienced by actors".

While this analysis will borrow from more structural notions of narrative, including the work of Propp and Labov, its epistemological assumptions will rest on more poststructural notions that divide narrative into story (structural elements) and discourse (the contexts in which the story is "read"). Therefore this analysis will be comprised of two components, one looking at narrative structures and the other looking at how those structures may be read in various contexts.

The MayaQuest analysis will also borrow from Vladimir Propp whose work showing the narrative structure of 100 Russian fairy tales has been influential in Narratology, the branch of narrative theory that focuses on narrative structure. Propp's morphology works by pointing out that a particular action may be done by any number of different characters in a story. This makes it possible to view a story in terms of the functions of its characters. Propp articulated 31 functions to describe the actions of characters and the consequences of those actions. According to Propp, the function of characters are independent of the characters' fulfilling their function and are the fundamental elements of a story. As Alan Dundes highlights in the introduction to the 1968 edition of "Morphology of the Folktale" Propp's structures can be applied to narratives other than folktales including other media that carry narratives like film and television. With minor adaptations, many of his functions can be utilized to examine the structures of modern narratives (of any genre). From Propp we learn that many modern narratives borrow their structures from Fairytales. While Prop examines narrative structures in term of the characters actions, Labov builds upon Propp's work to present a simple, but elegant, basic structure for stories.

According to Labov (1972) a fully formed personal narrative undergoes six stages: 1) abstract (i.e. why the story is being told) 2) orientation (i.e. time, place, characters, and situation) 3) complicating actions (i.e. crisis, obstacles, etc.) 4) evaluation (i.e. moments when the narrative is suspended to analyze its progress) 5) resolution (i.e. when the problem(s) are resolved and 6) coda (i.e. statements the reader to the present or indicate the end of the story). One can easily see the parallels between these six stages and Gagné's (1988) "events of instruction", an often referenced set of guidelines followed by instructional designers to stimulate learning within the lessons that they create. Like many theories derived from educational psychology, Gagné's "events" are derived from an individualistic epistemology whereby knowledge is acquired in the individual and the "mind" learns in isolation. In contrast, narrative theories influenced by Poststructuralism address how individuals and groups gain knowledge in social contexts. As Laurel Richardson (1990) remarks, "narrative is both a mode of reasoning and a mode of representation."

Film approaches to narrative theory and structure offer extensive frameworks with which to describe narrative in media. Bordwell and Thompson (1998) have written about the ways that narratives function in film. These structures provide a helpful language with which to talk about media design in general. Film theories of narrative, however, do not adequately address narratives that are experienced in everyday life such as the home and school.

Television theories of narrative, in contrast, depart from traditional realist narratives that try to construct a self contained, internally consistent world. In a realist narrative everything makes sense, but, of course, this does always occur in everyday life where many narratives don't end in tidy resolutions. Television, according to Fiske (1987) invites the reader into "producerly" relations with the text, especially in relation to the most common type of television narrative, the serial, a form taken up in the MayaQuest Online experience. Soap operas offer a good example of television narrative, that start from a place of disequilibrium and never reach a

point of closure. Even series, like situation comedies, that reach a conclusion at the end of each episode, never resolve ongoing conflicts. These ongoing conflicts either exist within character relationships or the situations that they encounter within their settings. Television theories of narrative offer more fractured constructs of narrative, due to television's serialization and commercial interruptions. This fractured structure creates conceptual spaces for greater variation in interpretation by the reader. Television narrative according to Fiske (1987), "must be able to build into it contradictions that weaken its closure, and fragmentation that denies its unity". In relation to time, Fiske (1987) notes that "television's sense of time is unique in its feel of the present and its assumption of the future." Television's "nowness" increases the emotional engagement of the viewer.

Time is the most widely used noun in the English language (Adam, 1995) and is involved in physical processes, as well as social conventions (Gosden, 1994). "We can't move through space without time and vice versa which means we can't pass, spend, or allocate time without occupying space. Nothing exists or happens without time or space." Consciousness, memory, and anticipation are closely tied to time. Everyone constructs their own meanings about time based upon their social, cultural, emotional, physical and psychological circumstance. Using Barbara Adam's (1995) term we shall call this unique perception of time "social time". She notes that western style education has worked to socialize, habituate, and train young people into a "clock time" approach to time that, in turn, has the effects of displacing the variety of times that comprise the multi-dimensionality of everyday life. The time of clocks and calendars (schedules, deadlines), "clock time", is only one aspect of social time. Individuals can imagine time in the past, the present and in multiple futures. Narrative theories of time address "social time" rather than only "clock time". Such an approach to time is much more appropriate to electronic learning environments that can be accessed at virtually any time of the day compared to the 50 minute segments of the average class period.

#### MayaQuest - Narrative Structure(s) and Discourse(s)

The following analysis will borrow narrative structures derived from the literary, film, and television narratives theories described above. Each of the subsections of the analysis will begin with a description of the narrative structure to be used. Following this summary will be a description of how that structure can be used to examine the pedagogy for the Internet and/or CD-ROM versions of the MayaQuest experience in relation to how they open up or close down single or multiple conceptual spaces. The structures selected are significant in that they represent familiar conventions to students who are acquainted with television and film-based narratives. Because students maintain these narrative literacies they possess epistemic access to them as meaning making structures. It should be noted that there are often overlaps between these various structures. The overlaps, however, are not significant enough to either collapse the categories or eliminate one. The analysis will attempt to address this overlap by either highlighting the overlap or conforming the analysis to the uniqueness of the specific structure.

**Story, Plot and Subplot** -In discussing film narratives, Bordwell and Thompson (1997) make a distinction between story and plot. According to them, **story** is the set of all events in a narrative; both those presented and those inferred. The world of the narrative is sometimes called the *diegesis* (Greek for recounted story). The **plot** contains both the story and other non-*diegetic* components that exist outside the story - elements like music. The plot goes beyond the story world. We create stories in our minds based on cues in the plot just as we create knowledge from external queues. The plot / story distinction can be discerned in all aspects of narrative, causality, time, and space. A **subplot** is a unified set of actions coincident with but subordinate to the main plot.

Propp calls the first communication of the story to the reader the "Initial situation" in which the main characters are introduced. Labov takes a slightly different perspective in communicating the initial story to the reader in describing the abstract of a structure that establishes why the story is being told. Important to note is who communicates the initial story, a character / narrator or an omniscient narrator. Of related significance is the reliability that is attributed to the narrator. This dynamic is similar to how a student attributes a level of accuracy and reliability about the information and source of information being taught based on her or his perception of the pedagogy that is being used to communicate the knowledge and the claims to authority made by the pedagogue (i.e. teacher or text). Readers (and students) often take information from the narrator (or teacher) as authoritative unless they possess the skills to challenge this authority and/or are given hints (by the text) that the information is suspect or partial. A narrative structure in media that opens up multiple conceptual spaces is one that calls into question its own claims to authority.

As was previously stated, the story of the MayaQuest Internet expedition is for students to "virtually" accompany six explorers on bicycles as they travel to Maya ruins in South Mexican and Central America to try to discover the reasons for the decline of the ancient Maya Civilization.

The abstract of MayaQuest, however, is not as clearly stated. "Why is this particular story important to be told?" is the question that must be answered in the abstract. This question could be answered on a number of levels. First, this story is being told because it brings the experience of an unfamiliar environment to the students who generally have not been to Central America and will probably never physically go there. Second, the story is being told because it raises unanswered questions about a civilization that was considered "ahead of its time" because of its numerical system and sophisticated astronomical and architectural knowledge. And third the story is being told to sensitize students to the environmental crisis that presently threatens the destruction of the rainforests in Central America. By looking at the abstract of MayaQuest one can articulate at least these conceptual spaces for students to build their own narratives about the MayaQuest experience.

The story and abstract of the CD-ROM are mostly similar to the online experience but have some variations. In some sense the CD-ROM is a little more of an open narrative (i.e. it possess less of a linear, prescriptive, structure compared to the online experience that progresses from a beginning to an end point in time) in that the user is provided with a number of choices about how to navigate its content. From the opening screen users are given the choice to look at a "bookshelf" of virtual books (generally, snapshots by one of the explorers with accompanying text), multimedia resource tools (where one can get background information about the Maya and rainforest and view media (e.g. sounds, videos, animations, etc.) of specific related topics; and finally users can play the Explore game and the Adventure game.

In the Explore game students have "30 days" to explore Maya ruins and go on missions assigned to them by incoming e-mails from various characters, including children who are in the same age group of the students who are likely to use the MayaQuest CD-ROM. Students can choose which missions to accept. In general, choices like this are considered instances of opening up more conceptual space. Closely linked with the idea of opening conceptual spaces is the notion of agency. Someone who possesses a sense of agency within a learning environment feels as if they possess some cultural entry into the multiple conceptual spaces that are offered. Generally the missions in the Explore game ask the user to find some piece of information at one of the Maya archeological sites. Students must ride their virtual bikes to the site, a process that involves trying to keep the bike on the rode with the computer's mouse, as one travels across dirt roads with frequent turns and obstacles. If one veers off the rode one risks injury to oneself and damage to one's bike, consequences that cost the student money and time. The Adventure game in many respects looks very similar to the Explore game, except it is based on a slightly different story.

The Adventure game takes place in a future where the earth is surrounded by a network of satellites that protect it from potentially cataclysmic incoming asteroids by destroying them in space with lasers. The game begins with an animated sequence in which Dr. Haley's shuttle craft is traveling from MayaQuest Headquarters in Central America to a space station (SkyBase 1) that coordinates the satellite network. Dr. Haley (a Maya scholar) is returning to SkyBase 1 in order to input new firing codes into the lasers. The firing codes are based on Maya archeology. As the shuttle is docking with the space station an asteroid passes close to the vessel and one of the satellites automatically fires at the asteroid missing it and hitting Dr. Haley's shuttle. Dr. Haley has enough time to download some of the codes before losing communication transmission as the shuttle goes spinning off into space. The goal for the student is to travel to Maya ruins (the same one's that are in

the Explore game) and get clues in order to recreate the new codes. This must happen within 15 days (game time, an hour clock time).

The CD-ROM provides easy access to the non-deigistic elements in the MayaQuest environments like music, environmental sounds, and video files. While navigating through the CD-ROM, music played as I entered into its different subsections. Buttons would make sounds when they were clicked and the video played almost instantly. Such elements created a different mood compared to the online experience which was mostly quiet. The mood created by the sounds produced a sense of anticipation about the content. Anticipation was created in different ways (i.e. through complications presented by the real time adventure) in the online experience.

Even though MayaQuest Online is presented in English and Spanish it is a predominantly American plot (travel narratives) which goes something like, "Americans travel to a faraway exotic land to send information back home about what they find". If the Spanish speaking students were mainly located in Central and South America then the plot would certainly be more unique to the social and cultural experience to children in these regions where rain forests and the "exotic" foods described by the explorers are closer to their daily narratives.

**Space, Place, and Setting** - Space is the place or places in which the situations and events represented (i.e. setting, story space) and the narrating instances (i.e. acts of recounting a series of situations and events) occur (Prince, 1987). Sometimes a narrative asks their reader to imagine places that are never shown. In narrative structures one can identify **plot space**, a **story space**, as well as **screen space**; the space within the frame. Screen space includes that which is shown on the screen and that which is suggested off screen. Related to space and place, the **setting** is the spatial and temporal circumstances in which the events of the narrative occur.

The MayaQuest experience takes place in various settings including Central America and the classrooms and homes throughout the world in which students engage with the MayaQuest online and CD-ROM experiences. To the student, all of these places, except for the physical space that s/he occupies, are virtual spaces, spaces that exist only in mediated forms. In the case of the CD-ROM the narrative also takes place in a virtual representation of outer space.

Specifically, the quest in MayaQuest takes place in the rainforests, towns, and Maya ruins of Central America which is the physical space occupied by the six explores, but only the virtual space of the students. One of the primary goals of MayaQuest is to bring these places to the students in their classrooms and homes. This goal is a significant component of the discourses that pervade discussions of the Internet in education. These discourses champion the Internet as a medium that is able to "take" students to places that they would not otherwise be able to experience because of limited time and resources. This raises important considerations about notions of space in education including, "What is a conceptual space (or spaces) that addresses how virtual "space" operates as a pedagogical space?" In other words, "How much "space" communicated over the Internet or symbolically (i.e. graphically) on a CDROM is "enough" space for a student to perceive it as a pedagogical space?" A pedagogical space is one in which students feel compelled to occupy as a place for knowledge construction and the building of understanding. Streibel (1998) argues that virtual space is never sufficient to create learning communities in which students are as invested and engaged as they would be in communities formed in physical space. Perhaps the dualism between virtual space and real space will need to be rethought in order to create an intersubjective space, a third space that possesses its own currency.

**Time** - Time is the period or periods during which the situations and events and their presentation occur. The plot may present the events of the story out of chronological order. In constructing the story out of the plot, the reader tries to put events in chronological order and assign them duration and frequency.

Because of the nature of new media (especially media that can accessed any time over the Internet) and the largely historical component of MayaQuest, time plays a large factor in the MayaQuest experiences. In MayaQuest time spans from 2000 BC to some time in an imagined future. Time is conceived of as periods marked by the (weekly) episodes of the online experience, as well as each session of time that a student engages (either directly while using the CD-ROM or web site or indirectly thinking about them while away from them) with one of the MayaQuest experiences. Recalling Adam's constructions of social time, conceptions of time also involve imagining possible pasts, presents, and futures. MayaQuest presents numerous conceptual constructions of time that allow for numerous opportunities to conceive of time in unique and individual ways. Perhaps this is not as much a function of MayaQuest and its narrative structures but in the complex ways that time is constructed by individuals.

A particular quality of interacting with an online program or communicating with others online is that it is possible to have these interactions during times other than the hours that students are in school. Students can potentially access MayaQuest online anytime during the quest, although this is not likely to happen since MayaQuest online needs a password to be accessed and these are issued to classes not individual students. Most of the activities suggested in the MayaQuest online curriculum guides are group activities (e.g. class projects). Although individuals can post individual projects, they are generally posted as contributions from a particular class.

The CD-ROM games occur in the past (i.e. ancient Maya), the present (i.e. when the game is being played), and the future (i.e. the game is set in the future). Yet, because they are all presented in the same narrative, they are all experienced as narrative time. The Explore and Adventure games compress time a great deal. The Explore game has a duration of 30 days (game time) and the adventure game has a duration of 15 days (game time). One can play the game in real time (i.e. clock time) and accede the time limit for each game after only playing the game for 10- 15 minutes depending on the choices made. This extreme compression of time is quite common in mediated learning environments and games.

It is difficult to say if this characteristic serves to open up conceptual spaces about time or close them down. I would venture, however, that a narrative structure which allows for multiple conceptual spaces of time is one that to use Adam's term opens the learning experience to "social time" and acknowledges the social constructedness of time. Both the MayaQuest online and CD in their own ways allow for various conceptions of time seen from the perspective of the MayaQuest stories or the conceptions of time presented to the user.

**Temporal Order** - By rearranging the order of events a narrative can create surprises.

Both of the MayaQuest environments present a temporal order that is relatively linear. The Maya history is presented from its beginning (2000 BC) to the present. The bicycle expeditions unfold from beginning to end. The CD-ROM games occur in linear time as well. The MayaQuest experience is presented in general, does not rearrange the temporal order of events, although one could imagine a structure in which events are rearranged and the consequences are hypothesized. One could imagine a game on the CD-ROM in which the user is asked to change the temporal order of the Maya history to see a simulation of the possible implications of the reordering.

**Temporal Duration** - Temporal duration describes how screen duration, plot duration, story duration; all can effect each other.

Because the MayaQuest learning environments are all interactive experiences, the screen duration is primarily determined by the student. Once the information has

been viewed on a screen the students can navigate to the next screen of interest. One exception to this is when one is traveling on bicycle in the Adventure and Explore games on the CD-ROM. In these games one must travel to desired destinations on bicycle using the mouse to determine speed and one's position on the rough dirt road. I found myself getting impatient waiting to get to a destination. If I tried to increase the speed then I generally fell off the rode and injured "myself" or damaged my bicycle. I tried one time to purposefully fall off the road as much as possible. This led to the bike going VERY slowly and taking even more time to get to my designation.

**Temporal Frequency** - Events can be repeated, either from the same perspective or from difference perspectives. Sometimes the narrative must motivate manipulations of time by cause and effect. Temporal frequency in narrative structure offers a close parallel to repetition in teaching. Repetition is often an important pedagogical strategy, especially when the repetition happens with variation (i.e. the same piece of information is presented in different manners or contexts.)

MayaQuest online presents temporal repetition by recounting the same part of the adventure from the different perspectives of the explorers. This occurred when a Jaguar entered the camp one evening during MayaQuest '98. The encounter was retold in the team's weekly update, as well as, described from the perspective of the various explorers according to their area of expertise; for example, from the perspective of the Ecologist, the Mayanist, and the communications expert. The ecologist discussed how Jaguars are the largest cats in the rainforest, while the Mayanist described how Jaguars were used as symbols by the ancient Maya to represent a good hunt, and the communications expert talked about how he was constantly looking over his shoulder after the Jaguar was spotted near their camp. The fear caused him to take an extra hour to setup the uplink to the satellite that night. These all represent the opening up of multiple subjective spaces and represent one way that MayaQuest succeeds in this.

The CD-ROM creates repetition in its own ways. First much of the content that is presented is repeated, however it is reproduced in different contexts. For examples, photographs are reproduced in different parts of the CD-ROM (i.e. the picture albums and informational sections on the rainforest) with different texts accompanying them. Sometimes the same content (pictures AND content) are placed in different parts of the CD-ROM. It is interesting how the context of the same content can effect the meanings that I made. For example if information about an animal, a jaguar, for instance, is presented in one of the personal photo albums of the explorers compared to a section on "animals in the rainforest" I will store it in different schemas in my brain (one within a narrative (adventure) schema and another within a school based factual schema). I would argue that narrative schemas and "scholarly" cultural models and epistemologies are often kept separate.

Also in the CD-ROM, the Adventure game and Explore game overlap in 90% of their content. Once one is on the way to a particular archaeological site the content is the same between the two games. Again the difference is in the framing according to the goals of the game. It seemed to me that the Explore game provided a good preparation for the Adventure game, where the stakes where higher (saving the earth from an rogue asteroids) and the time frame was shorter (15 days instead of the 30 says set for the Explore game).

**Character and Characterization** - Characters can often be major or minor depending on their textual prominence. Characters can be dynamic, if they change; static, if they don't; consistent, when their actions and attributes do not result in contradictions, or Inconsistent; characters can be flat, predictable and endowed with few traits or round, capable of surprising behavior. A narrative must find ways to make the characters of interest to the reader. It must make them extraordinary. Characterization is the set of techniques resulting in the constitution of the character and can occur through description (direct characterization) and action (indirect characterization through deduction). Often characterizations are based on stereotypes, ideas people share about what various groups or categories of people are like. Stereotype are metonymies and are used by authors to characterize people quickly. Stock characters are characters that are recognized as particular types, often times they take the form of stereotypes.

The characters in the MayaQuest web experience include students, working teachers, teachers continuing their education', the "explorers", the people encountered along the way, including indigenous peoples and on-site anthropologists, and the group of Maya and Rainforest experts. Students act as both readers and characters in MayaQuest. This is perhaps one of the primary ways that the MayaQuest online experience works to open multiple conceptual spaces. By having some influence (more on this later) in the development of the plot, students can see themselves as characters (possessing agency) within MayaQuest. During the MayaQuest 98 expedition, the Message Board was a place for students to share from around the US and the World to share their experiences and meet "teammates" (other students)

According to my reading the characters and characterization in MayaQuest were generally flat and static. No one (students or explores) seemed to undergo any dramatic changes as a result of going through the MayaQuest experience. The explorers were enthusiastic about the adventure before and after the quest. Not one explorer became disillusioned with the experience to want to quit or become a dissenting voice about the goals of the quest. (Such a conflict would have, for me, made MayaQuest a more compelling narrative.) The complications and crisis faced by the explorers always came from the outside (generally difficulties with travel) and the explorers always addressed this adversity with aplomb and courage. It was difficult to get a sense of the students as characters. There communications on the message boards were generally short and didn't provide much information about them. Each week of the four an in depth portrait was presented of one of the children encountered by the explorers. These portraits were helpful for me in creating rounder characters, but again there was little depth presented in these characterizations.

**POV** - Point of View or as Bal prefers to call it 'localization' is, the relationship between the 'I vision', the agent that sees, and that which is seen". Important in examining POV is noticing who is telling the story and how much the storyteller knows about the plot and what is happening in the minds of the other characters.

MayaQuest is mostly told from the perspectives of the six explores. Students are offered a vision of Central America through their eyes and experiences. Often what they see is mediated through the experts mentioned above. The experts give discipline-specific interpretations of the ruins, flora, fauna, terrain and peoples encountered along the way. By the time the student receives the information it is fairly "cooked" for their consumption. This is one area where the Maya experience serves to close down conceptual spaces. Granted the students must have some sort of background with which to filter the experience and make sense of it, however, it is never explicitly communicated that what they being exposed to is a uniquely "MayaQuest" POV of Central America. The experience is quite structured to fit into particular viewpoints, epistemologies and ontologies that are not particularly self reflexive, an important component of open conceptual spaces.

**Motivation** - A character's motivation tries to explain the reasons that characters do what they do. Character motivation is distinct from student motivation in learning.

What motivates the characters in MayaQuest? This is not an easy question to answer for two reasons. First without asking the characters it is hard to know this information and second in some respects much of the narrative is open in MayaQuest since one is never totally certain what problems (conflicts and dilemmas) the team will encounter or artifacts that it will find for analysis. Nevertheless, one can assume unless confronted by tremendous tragedy the quest will continue until its scheduled end and not go a day longer. The students could be motivated to participate for any number of reasons. They could be interested in the interactive nature of the online experience and the challenge of the online and CD-ROM games or they could just be required to participate by their teachers.

It would be helpful to frame constructions of "motivation" from within narrative perspectives of the student as a character (a subjectivity) compared to dominant educational discourses that frame "motivation" as an inherent trait of the student. Seeing motivation as a (narrative) character trait promotes conceptual spaces for students which do not try "know" who a student is, but instead acknowledges the contextual nature of motivation, a nature which is always already beyond comprehension.

**Tone & Voice** - Tone and voice are the persona(s) that the author takes with the reader (e.g. playful, serious, ironic, angry).

In MayaQuest online, students are addressed by the explorers informally and in a friendly demeanor. The tone is fun and upbeat. The tag phrase of MayaQuest is "Pedals Up!". It is apparent that the designers of MayaQuest want it be a fun and personal experience with the students and don't want them to feel as though they are lost in a sea of the millions of students that join the quest. Students seem to respond well by the tone set by the explorers judging by their posts to the message boards, which are friendly and encouraging. One does wonder, however, how much of those posts are mediated by teachers and what students would ask without this supervision. I would venture to guess that the conversations would be somewhat different.

The address in the MayaQuest CD-ROM is also light and friendly. The text that accompanies the pictures taken by the explorers is light and conversational and generally spoken from a first person perspective. Even when students lose Explorer or Adventure games they are consoled with encouraging words to try again. Occasionally, when the user appears to be wasting time: by spending "too much" time at a site, they are reminded by one of the virtual characters in the game that "time is running out." While creating a motivating factor in terms of the game, one wonders about the pedagogical implications of placing such time limitations on learning and how the imposition of "clock time" affects the perception of "learning time" as something that always has time limits.

**Parallelism** - Parallelism is the process of cueing the reader, to compare two distinct elements, by showing their similarities.

This is a common technique in the MayaQuest experience. The most prominent parallelism is between the events of the past (the fall of the Maya as a result of environmental mismanagement) and the ecological issues presented by current human practices in the rainforests in Central America. It is interesting how such a strong parallelism can eventually make itself invisible. It could be easy when looking at the MayaQuest web site to miss the parallels drawn between the historical past and present events and frame MayaQuest as a journey to Central America to learn about the rainforest. Learning about the Maya and their decline often seem like secondary goals of MayaQuest. Most of the online student projects (e.g. writing and artwork) that I observed dealt with some aspect of the flora, fauna, and/or ecological concerns of the rainforests in Central America.

**Cause and Effect** - Characters create causes and show effects. Not all causes start with characters; they can be triggered by an event. Cause and effect can be explicit or inferred. Sometimes information is planted in the reader that will be used later. Space can also be the basis for a plot pattern. For any pattern of development the reader will create a set of expectations. The pattern of development in the middle portion often delays an expected outcome. The plot may withhold or give information for the sake of curiosity or surprise. Narration is the plot's ways of distributing the story information in order to achieve specific results.

In both the Online and CD-ROM versions of MayaQuest, cause and effect play a primary role in the narrative structure. We are presented with an effect: the fall of the ancient Maya civilization and are asked to find the cause(s). The entire quest is structured to find this cause. The participants are presented with a number of possible causes (e.g. violent warfare, natural disasters, environmental mismanagement etc.) and are asked to use the given evidence to draw a conclusion. The experts that participate in each years MayaQuest certainly frame the cause and effect relationships that can be established.

Because the MayaQuest CD-ROM is generally a closed educational system and users cannot add any new data, it asks the users to solve particular questions that are presented to them in the Explore and Adventure games. The answers to these questions can be discovered within the content of the CD-ROM. As stated in the manual, one of the primary purposes of the CDROM is to prepare the student for the online experience. One wonders, however, if the relatively closed structure (pedagogy) of the CD-ROM acts as a way to minimize the kinds of possibilities (causes) that students will consider in the online experience.

**Complication** - Complications represent the introduction of oppositions, conflict, and tension into the exposition. The exposition is the setting of the narrative, characters, etc. As the plot proceeds a narrow set of plot possibilities emerges based on the ways that characters respond to the complications within the plot. The most common pattern of development in a plot in response to complications is a "change in knowledge" where a character learns something that is the turning point of the plot.

The complications in MayaQuest online exist on two levels: those that are encountered by the explorers and those that are imposed on the students. The explorers must contend with the difficulties of traveling hundreds of miles through the rainforests of Central America on bicycles.

This presents numerous complications. Students, on the other hand must be provided with complications. This is accomplished through weekly problems that students are asked to solve in different curriculum areas including history (the weekly History Mystery) and science (the weekly Science Stumper). In addition to these problems, each week presents several new "Mystery Photos" that challenge students to identify animals, plants, artifacts, and other sights that the team has seen. A popular component of the web site is "Dan's Dilemma" in which students must "weigh opinions and make decisions" about complications that the team encounters. In describing "Dan's Dilemma" the web site states,

While traveling through the rainforest, we sometimes face questions that are hard to answer. For example, when we showed two 11-year-old boys their first computers, they came to our hut every day to play the video games we had on our hard drives. After several days, we realized the boys were ignoring their old toys of play bow and arrows and clay figurines. We started to worry that sharing the technology may have left them bored with simpler forms of entertainment. What do you think we should have done? Help us solve difficult issues like this one every Thursday in Dan's Dilemma."

Here are the results of "Dan's dilemma" during the 1997 MayaQuest online experience:

April 10, 1997 Vote Results: It was right to kill the snake. Students voted whether or not to kill a poisonous snake that was

in the explorer's camp.

April 4, 1<sup>st</sup>7 Vote Results: Stay in camp and recuperate. Students voted whether or to stay in camp because the expedition leader (Dan) was sick. The dilemma was that if he stayed and rested he would not be able to give the students a full report for the week

March 27, 1<sup>st</sup>7 Vote Results: Flip the stones. Students voted on whether or not the explores should turn stone carving over to protect them from erosion by min. The dilemma was that they would do so without the permission of the Belize government which prohibits the moving of artifacts without its permission

March 20, 1997 Vote Results: Use the native cure, "contra yerba.1' Students voted on whether or not if bitten by a poisonous snake that the explorers would a use a local remedy or a western anti venom.

March 13, 1997 Vote Results: Trash the photo. Student had to decide whether to erase a digital picture of an alter that the explorers were asked not to take by their guide. The picture apparently was rare.

The decisions were always presented as binaries, thereby according to the definition of multiple conceptual spaces these "complications" would generally count as a closing down of multiple conceptual spaces, since they were not really given the choice to explore other options then the two presented.

**Crisis (climax)** - Related to complication(s), the crisis (climax) marks the turning point of a narrative. The narrative generally ends by resolving the causal issues after going through a climax. The climax narrows the causal issues that occur throughout the narrative by lifting the reader to a high degree of tension and suspense. Some narratives are deliberately anticlimactic. Open endings provide the opportunity to imagine what might have happened had the climax been resolved.

Crisis presents a compelling component to any narrative including MayaQuest. Without the problems that befell the explorers the students would have had no reasons to care about them. For example in MayaQuest Online '97 "Lost Cities of the Rainforest", the climax builds as the explorers get closer to ruins that had never been seen or rarely been seen by non-indigenous peoples. A great deal of the narrative space is dedicated towards building anticipation of this climax. The explorers sense of wonder and excitement is therefor magnified when they finally reach a "lost city", usually after an arduous journey.

Crisis is created in the CD-ROM in different ways compared to the online experience. In the case of the CD-ROM the crises must be manufactured compared to the "real" crisis faced by the explores in the online experience. In the games the crisis is created by the situations that the players are placed in (e.g. to find the codes to save the earth, to perform the missions before the rainy season begins.) In one of the photo albums a crisis is retold when a serious of pictures reveals how Julie Acuff, the team archeologist, shows up late for a particular rendezvous. The crisis takes the form of small episode in which she is late, the climax builds until she finally shows up, and the resolution exists in telling the reader why she was late (heat, mechanical

problems and rough terrain.)

**Episode & Event** - An episode is a scene in which action takes place. It is generally marked by a rising and falling in action. An event provides a "transition from one state to another " (Bal, 1985)

Each week within the 4-6 week MayaQuest online experience can be seen as a new episode. It begins on Mondays, when the students "set the course", voting on where the team should travel next. During the week students receive updates about the teams discoveries and progress. Each week ends with a team report in which students are given a summary of the team's progress and prognoses for the future in terms of possible itineraries.

Events in MayaQuest online are marked by discoveries at Maya archeological sites, personal problems of team members (e.g. sickness, injury, etc), and group problems (e.g. difficulties in travel due to path conditions or equipment malfunctions (bikes or computers). These events represent the most important aspect of any interesting narrative- the introduction and resolution of conflicts. MayaQuest is a successful narrative on this count. It presents numerous events and episodes that mostly lead to resolution. It could be argued that such a consistent structure in narrative is not necessarily a productive pedagogy, in that, often in student's day to day experiences conflicts do not see the tidy resolutions that accompany such narratives. I would argue, however, that this is not an inherent function of narratives per se, but more a symptom of the way that narratives structures have been appropriated. The television narrative structures outlined by Fiske earlier offer stronger parallels to everyday life in the way that they present on-going conflicts that never achieve a state of total resolution.

**Frame** - A frame is a narrative that provides a means of telling other narratives.

The two media that are presented in this analysis act as frames. The home page of the web site presents itself as an entry way into the various narratives that exist there, including the chat rooms, voting areas, galleries of student work, mystery photo area, personal experiences of the various team members, and background information about MayaQuest and the Maya. The main menu of the CD-ROM acts as a frame for the two games, photo albums, and media as described earlier.

Viewing media as a frame like this allows one to talk on a high level about how a mediated narrative like this is organized. Educational media like CD-ROMs, web sites, and virtual environments generally do not present just one narrative, they act as gateways to a number of educational narratives. How these overarching frameworks are presented shapes the students experience of the narratives within. The MayaQuest CD-ROM and web site are framed in the "traditional" style of offering the student menus of choices to select from. Such a structure is easy to navigate.

Nevertheless, one could also conceive of more innovative frames for the MayaQuest content. For example one could imagine a framework similar to the one presented by the game Myst, that also frames the telling of interrelated narratives. However, one is not explicitly given any background information about the land of Myst. One is simply dropped off on the dock of the island and one must find clues about the island's stories. The island acts as a frame for it's own narratives. One might imagine a frame for MayaQuest in which one is dropped off at some point in time in the ancient Maya civilization and one must discover the cause of its collapse by interacting with characters and narratives from that time based on information that already exists about the ancient Maya. Such a frame would produce a different experience of similar narratives.

**Symbolism** - Symbolism is the use of objects, events, or actions to stand for something outside

themselves.

Here, I will offer one small example of the symbolism that exists in MayaQuest. The use of the rainforest (and its destruction) is used as a symbol for the (green) environmental discourses that pervade both the online and CD-ROM versions of MayaQuest. The prescriptive conceptual space established in the MayaQuest experience by the prominence of an environmental narrative is clear. Many (if not most) of the student projects that I observed had to do with either the flora and fauna of the rain forest or the environmental concerns produced by heavy deforestation in the region. Here is a poem written by one the students participating in MayaQuest '98.

Roar, caw, caw, caw, roar, Animals plentiful ... Now endangered  
Once a vast jungle now empty, Tropical forest now turned  
to desert, Loud volume extinct .... Quiet.

**Theme** - The theme is the message a narrative conveys about life and human relationships.

Some of the themes that emerge in MayaQuest are the following:

Learning can be fun (an adventure).

It is important to learn about the rainforests and save them from destruction by humans. It is easy (and desirable) to virtually travel to distant places in order to learn about them.

The rainforest is a difficult place to travel and presents many obstacles to people who live there and travel there like the MayaQuest explorers.

The Maya are an important civilization to study.

Discerning the themes in a narrative is dependent on the theoretical perspectives that one takes in an analysis. For example, if one were doing a Marxist analysis of MayaQuest one would probably present a different set of themes than if one were doing feminist analysis of MayaQuest.

**Resolution and Coda** -The resolution of a narrative describes how things turn out after the climax. As Labov notes the coda lets the reader know that the story is over and returns them back to their own time and place.

The end of MayaQuest '98 ends with the pronouncement by the explorers and experts that the fall of the Maya civilization was the result of a shortage in food due to do an over stressing of food production capabilities within the rainforest. The resolution seemed to be more of a consensus between the experts and the explores than between the experts, explores, and students. Students are returned back to their own time and space by congratulating them for their contributions to the success of the quest and telling them about the next quest experience in Africa in the Fall. MayaQuest is sponsored by Classroom Connect (<http://www.classroomconnect.com>), a for-profit creator of educational content. This promotion of the next quest in the coda is an important indicator of MayaQuest as a capitalist narrative.

A successful resolution of the Adventure game occurs when the student has sent back all the clues for the laser firing codes. If they do not succeed then the game merely thanks them for their efforts and tells them that the space station will figure them out on their own. The earth is not destroyed by a huge asteroid because the user did not meet the deadline. The game merely asks the user to try again. Similarly, a successful resolution of the Explore game occurs when the user completes enough of the tasks before the rain season begins in 30 days. Like the adventure game if the student does not succeed there are few consequences, except that the game asks the student to try again. The minimal consequences for unsuccessfully completing each of the two games minimizes some of the impact of these narratives

A compelling narrative is one in which the actions of the characters has a significant effect on the outcome of the narrative. This addresses the issue of the limited agency given to students in the online experience and the CD-ROM. The relationship between conceptual space and agency is a close one. If a conceptual space does not provide the student with the ability to have some effect on the shape of that conceptual space, then the student is given less access to that space and is positioned (i.e. addressed) as a passive observer more than an active character.

## Conclusions

Returning a final time to the quote from Morley and Banks will assist in highlighting the potential implications of narrative approaches to educational new media analysis. If Morley and Banks are correct in stating that industrialized societies are in the midst of a period marked by the, "restructuring of information and image spaces and the production of a new communications geography" and "our senses of space and place are all being significantly reconfigured" then it is now appropriate to reconsider how electronic learning environments are designed and studied in relation to the ways that they have been traditionally designed. Narrative theory provides numerous theoretical lenses (e.g. narrative structures, narrative/narrator relationships, etc.) with which to analyze the new communications geographies that electronic learning environments will populate. As has been displayed in this essay, one of the primary theoretical benefits of using narrative theory as the foundation for educational media analysis is its ability to easily mesh with cultural theories of pedagogy based on race, class, gender, ethnicity, sexuality, nation, etc. It is within these subjectivities that multiple conceptual spaces need to address. For example, it would be not be difficult to imagine a narrative design that is sensitive for example to the politics of representation.

As distance education becomes a more pervasive form of learning and learners become more dispersed across dimensions of space and time, it will become necessary to develop more sophisticated theories of how learning environments address (or fail to address) the multiple cultural models that diverse learners will possess. This study of the MayaQuest web site and CD-ROM provided a productive case study with which to think about the framing of electronic learning environments through narrative theory. It revealed an important consideration when designing such an environment for use by a large population of learners: that even the best designed environments can never fully address the multiplicity of learners that will use it to construct knowledge. Therefore a design that genuinely opens up multiple conceptual spaces is one that leaves room for the creation of new pedagogies created within the unique localities that it is used. Such a design

allows for and encourages the embedded stories to always be retold within new contexts to create new knowledges.

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